COMMERCIAL

Ford

CAR AND TRUCK

INSTRUCTION BOOK

V-8 AND 4 CYLINDER

FORD MOTOR COMPANY
DETROIT

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Form No. 1

FOREWORD

This book contains information necessary to the proper care and operation of the Ford commercial cars and trucks. For your convenience we have combined suggestions for their operation and for the avoidance of most of the more common abuses in one article under the heading "The Owner's Responsibilities" (see page 6). Read it carefully; attention to the suggestions offered will go far to increase your satisfaction with your car or truck.

Driving instructions and detailed explanation of the controls have been omitted from this book. Your local Ford dealer will explain the various controls to purchasers having no previous driving experience.

An accurate record of operating costs probably contributes more to the commercial car owners appreciation of the Ford car or truck than any other one thing. If you are not already keeping accurate records we urge you to do so and have included a brief form on the back page of this book as a suggestion as to method.

To insure uninterrupted service, it is recommended that you have your lubrication and maintenance work done by an authorized Ford dealer; however, for the owners who are unable to take their car to an authorized Ford dealership for lubrication and maintenance service, instructions have been combined in one article, starting on page 10, which will lessen the possibility of any points being overlooked.

The various units of the car are explained in detail, starting on page 21.

When repairs or replacements are necessary, it is important that you use genuine Ford parts and have the work performed by competent mechanics. Expert workmanship is just as essential in the servicing of your car as it is in building it. Factory trained mechanics are employed by authorized Ford dealers and only genuine parts are used.

Specifications and License Data

Engine

V-8.....90 degree, 8-cylinder, V-type

Cylinder Bore.....$3\frac{1}{16}$ inch
Stroke.....$3\frac{3}{4}$ inch
Horsepower (S.A.E. rating).....30

Engine Lubrication—Positive displacement gear pump direct to crankshaft main and connecting rod bearings, and camshaft bearings, by splash to balance of engine.

Oil pan capacity .....5 quarts.

Cooling System Capacity.....22 qts.

Carburetor—Air Vane Type Downdraft.

Engine Number is also the serial number of the car. The number is stamped on top of the clutch housing, also on the frame side member in front of left dash bracket.

4 Cylinder.....Cylinder Bore.....$3\frac{7}{8}$ inches
Stroke.....$4\frac{1}{4}$ inches
Horsepower (S.A.E. rating).....24.03

Engine Lubrication—Positive displacement gear pump direct to crankshaft main and all camshaft bearings, by splash to balance of engine. Oil pan capacity 5 quarts.

Cooling System Capacity (Car)...12 qts.

Cooling System Capacity (Truck) .13 qts.

Carburetor—Straight Tube Type Updraft.

Engine Number is also the serial number of the car. The number is stamped on the top of the flywheel housing on left side just above the starting motor.

Transmission

Car.....Synchronized selective sliding type with helical constant mesh gears in second speed. Three speeds forward and reverse.

Truck.....Four speeds forward and reverse.

Clutch

Type.....Single plate dry disc.

Brakes

Car.....Four wheel, internal expanding brakes operated by the foot brake pedal and the hand brake lever. Total braking surface 186 square inches.

Truck.....Total braking surface 475 square inches.

Steering Gear

Car.....Semi-reversible—Hour glass worm and sector ratio 15 to 1.

Truck.....Semi-reversible—Hour glass worm and sector ratio 17 to 1.

Rear Axle

Car.....¾ floating type with spiral bevel drive gears and torque tube drive. Straddle mounted drive pinion gear.
Ratio.....4.11 to 1

Truck.....¾ floating type with spiral bevel drive gears and torque tube drive. Straddle mounted drive pinion gear.
Ratio.....5.14 to 1 (Optional 6.6 to 1)

Wheelbase and Turning Circle

Car.....112 inch.....40 feet
Truck.....131½ inch.....46 feet
157 inch.....57 feet

Tread

All Cars and Trucks.....56 inches

Road Clearance

All Cars and Trucks.....9 inches

The Owner's Responsibilities

The Ford Commercial car has been designed and built so that it will furnish a safe, comfortable, carefree and economical means of transportation for many thousands of miles. However, no amount of engineering ingenuity or care in the manufacture can take the place of reasonable care and an avoidance of malpractices by the driver.

The following suggestions are offered to assist you in the operation of the car:

Familiarity with the points requiring periodic attention to maintain their efficiency is essential. These points are completely covered on pages 10 to 20.

When shifting gears, move the gear shift lever as far as it will go, this will hold wear of the gears to a minimum.

Avoid driving with your foot resting on the clutch pedal as this may cause the clutch to slip, causing premature wear of the facings and the clutch release bearing.

Have your clutch pedal adjusted when the free movement becomes less than one inch.

Depress the clutch pedal while starting the engine, particularly in cold weather. This lessens the load on the starter and decreases the draw on the battery.

Maintain the correct air pressure in the tires not only to reduce tire wear and save fuel but as a safety measure to improve braking and steering.

Do not use boots in the tires on the front wheels. They destroy their balance and are a constant menace to your safety when the car is operated at the higher speeds.

Wheel and axle shaft nuts must be kept tight at all times. This is particularly important on the Truck.

Strong door, steering and ignition locks are provided. Lock the car when parking. Keep a record of the various key numbers. It may save you from inconvenience should any of the keys become lost or misplaced.

Do not operate the engine with the oil level below the "L" mark on the gauge. It however is not necessary to add oil until the level has dropped to within ½ inch of the bottom end of the gauge. **Check the oil level every 100 miles when operating under high speeds.**

Owners operating cars or trucks under **extremely dusty conditions should install a Ford oil bath type air cleaner** to prevent rapid wear of the internal parts of the engine.

Permitting the engine to idle long enough for the valves to cool before turning the ignition "off" will materially lengthen the life of the valve when the engine is operated under sustained high speeds.

The finish of the body and fenders should be protected from the elements by a suitable body polish. The twice yearly application of Lincoln polishing wax will provide excellent protection, preserving the original lustre and beauty.

Do not apply top dressing to a new top. Top dressing should not be applied before the material starts to check.

Do not add cold water to an overheated cooling system. Allow the engine to cool off before adding water as the sudden contraction of the cylinders by the cold water, may crack them.

A new machine requires more careful attention during the first few days it is being driven than after the parts have been thoroughly "worked in." To obtain best results, do not drive faster than 35 miles per hour for the first 500 miles with cars or trucks equipped with 3 speed transmission; with the 4 speed transmission do not drive faster than 20 miles per hour for the first 250 miles.

During Cold Weather

The cooling system should be protected from freezing in winter by the use of a suitable anti-freeze.

Avoid racing the engine while it is cold.

Always push the **choke button** all the way in as soon as the engine has warmed up on cars or trucks equipped with the V-8 engine. Continued operation with the choke button out causes serious dilution of the oil in the engine oil pan. (The choke button on the 4 cylinder engine is automatically returned to normal position by spring action.)

In zero weather the running of the motor for approximately one minute before turning on the lights will reduce the possibility of their burning out while the generator charging rate is adjusting itself to the high resistance offered by the cold battery.

Drain water and sediment from the fuel pump as often as necessary to prevent freezing.

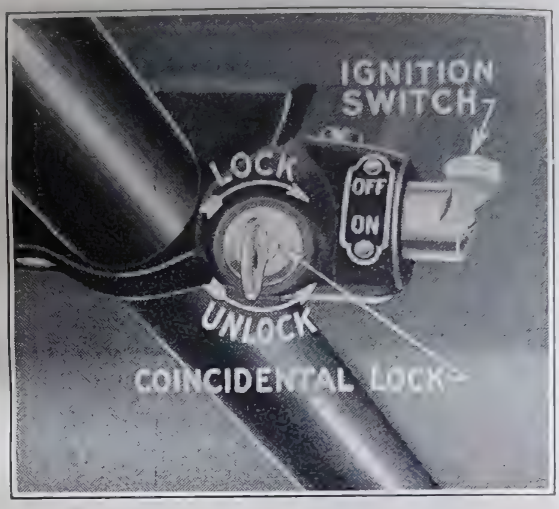
Engine oil diluted with either gasoline or water has little lubricating value and **regardless of its mileage should be replaced** with oil of the proper viscosity and quality. Watch the oil for dilution, particularly in cold weather when engine is operated under sub-normal temperatures.

Starting the V-8 Engine

(1) Unlock the coincidental lock on the steering column bracket by turning the key one-half turn in a counter-clockwise direction.

(2) Pull the ignition switch lever back—to position marked "on" (see Fig. 1).

(3) Be sure the gear shift lever is in neutral position (the position in which it can be moved freely from side to side).



Steering and Ignition Lock
Figure 1

(4) Pull the choke button out. If the engine is cold pull the choke button all the way out.

(5) Press on the starter button. (In cold weather the starter will crank the engine more easily if the clutch is disengaged.)

(6) As soon as the engine starts, remove your foot from the starter button.

(7) Push the choke button in as far as possible without disturbing the smooth performance of the engine.

As soon as the engine is warm push the choke button all the way in.

Important

When starting a warm engine do not pull the choke button out unless the engine fails to start on the normal mixture as there is a possibility of flooding the engine with an over rich mixture of gas. If you should by accident flood the engine, pull the throttle button out **slowly** and with choke button in normal position crank the engine a few revolutions with the starter to exhaust the rich gas. Avoid moving the accelerator pedal while exhausting the rich gases, as any quick movement of the accelerator would cause the accelerating pump to inject a spray of fuel into the carburetor throat, which would increase the fuel in the already flooded engine and make restarting difficult.

Avoid racing the engine while it is cold.

Starting the 4 Cylinder Engine

(1) Unlock the coincidental lock on the steering column bracket by turning the key one-half turn in a counter-clockwise direction.

(2) Pull the ignition switch lever back—to position marked "on" (see Fig. 1).

(3) Be sure the gear shift lever is in neutral position (the position in which it can be moved freely from side to side).

(4) Pull out the throttle button approximately ½ inch or until the accelerator pedal moves slightly downward.

In cold weather turn choke button one full turn in an anti-clockwise direction. Turn all the way back as soon as engine has warmed up. **Never operate the engine with this adjustment open after engine has warmed up.**

(5) Pull out on the choke button, holding it out while you—

(6) Press on the starter button.

(7) As soon as the engine starts release both the starter and choke buttons (both are returned to normal position by springs). **(The starter will crank the engine more easily if the clutch is disengaged.)**

(8) Push the throttle button in. (This will slow the engine down to idling speed.)

Important

When starting a warm engine do not pull out or turn open the choke button unless the engine fails to start on the normal mixture, as there is a possibility of flooding the engine with an over rich mixture of gas. If you should by accident flood the engine, pull back the throttle button and with the choke button in normal position crank the engine a few revolutions with the starter to exhaust the rich gas.

Avoid racing the engine while it is cold.

Lubrication and Maintenance

The importance of proper lubrication and periodic inspection and adjustments cannot be over-emphasized. The lubrication and maintenance work on the Ford commercial cars and trucks both V-8 and 4 cylinder can be divided into two groups; first, points requiring attention every 1000 miles; second, points requiring attention twice yearly or every 5000 miles (whichever occurs first).

The lubrication chart on pages 16 and 17 gives full information for the complete lubrication of the V-8 ½ ton commercial car.

The lubrication chart on pages 18 and 19 gives full information for the complete lubrication of the 4 cylinder 1½ ton chassis.

Proper lubrication has a vital effect on the life of any machine, consequently you should follow these instructions very carefully.

All Ford dealers are equipped to render this lubrication and maintenance service.

Group 1

Engine Lubrication

It is advisable to clean out the oil pan by draining off the old oil when the new car has been driven 300 miles, and again when a total mileage of 1000 miles has been reached and at each 1000 miles thereafter. The oil will drain out more completely if warm, and should be replaced with 5 quarts of engine oil of the proper viscosity and quality.

The oil level should be checked every 100 miles, and additional oil added when required to bring it to the proper level.

Figure 2

Since more oil is consumed by the engine at the higher engine speeds, its level must be watched closely when the engine is operated under sustained high speeds.

To determine the correct oil level, use the bayonette oil gauge located on the left side of the engine (see Fig. 2), as follows: Pull the gauge—wipe it off—re-insert and again remove it.

The mark made by the oil indicates its level. When the oil reaches the point marked "F" on the indicator, it is at the maximum level. Oil above the "F" mark on the gauge is of little value and is quickly wasted. **It is not necessary to add oil until the level is down to within ½ inch of the end of the gauge.** However, under no circumstances should the oil level be permitted to get below the point marked "L."

When replacing the oil level gauge, push the indicator all the way down. Failure to fully insert it into the opening permits oil to escape.

Only high grade engine oil should be used in the engine. Oil of this kind reaches the bearing surfaces with greater ease and cuts down frictional heat. It should have sufficient body so that the pressure between the bearing surfaces will not force out the oil and allow the metal to come in actual contact. Inferior oils have a tendency to carbonize quickly, also "gum up" on the piston rings, valve stems and bearings.

In cold weather a lighter grade of oil having a low cold test is absolutely essential for the proper lubrication of the engine. Oil having the specifications of S. A. E. viscosity No. 20 should be used for temperatures below freezing. For temperatures below zero a winter oil of S. A. E. viscosity No. 10 will be satisfactory. It is essential, however, that these winter oils have a low cold test.

In general an oil having the body of S. A. E. viscosity No. 40 will prove satisfactory for summer use (temperatures above freezing). In sections where the temperatures exceed 90 degrees Fahrenheit an oil having S. A. E. viscosity No. 50 may be used.

It must be understood that these classifications are of "body" only and not of quality. It is also essential that the oil be otherwise properly refined.

Chassis Lubrication

The chassis should be lubricated as outlined below after each 1000 miles of operation. For your convenience, it is suggested that the lubrication of the chassis and the changing of engine oil be performed by a Ford dealer at the same time.

Transmission

Each 1000 miles, sufficient gear lubricant should be added to bring it level with the filler plug hole. (See page 15 for further instructions).

Rear Axle

Each 1000 miles, sufficient gear lubricant should be added to bring it level with filler plug hole. (See page 15 for further instructions.)

Clutch Release Bearing

The clutch release bearing is lubricated through a grease cup, located on the hand hole cover of the clutch housing. After every 1000 miles of operation, the cup should be screwed in as far as it will go. This will force the lubricant into the bearing. The cup should then be backed off and repacked with a good grade of pressure gun lubricant and replaced, screwing it in 2½ to 3 turns. Note: the clutch is a dry disc clutch and under no circumstances should it be oiled.

Steering Gear

Every 1000 miles, remove the plug on the steering gear housing and add gear lubricant until it reaches the level of the filler plug hole. Use gear lubricant only, never use greases in the steering gear. A gear lubricant of S. A. E. viscosity No. 160 will be suitable when temperatures above freezing prevail. S. A. E. viscosity No. 110 should be used for temperatures below freezing.

Generator

The bearings in the generator are lubricated through a small oil hole, located at both ends of the generator. Fill with engine oil every 1000 miles.

Distributor

Fill the oil cup every 1000 miles with engine oil.

Universal Joint

Each 1000 miles, the universal joint housings should be filled with a universal joint lubricant composed of cylinder oil, thickened with sodium tallow soap. The universal joint housing is provided with pressure gun lubricator fittings (pressure gun grease is not satisfactory for universal joints).

Pressure Gun Fittings

In order to properly force lubricant to all parts equipped with the conical shaped lubricator fittings, a high pressure compressor gun is employed. With this gun, the lubricant can be forced in under a pressure of 2000 pounds or more per square inch, thus assuring a more thorough and positive lubrication than can be accomplished any other way.

Ford dealers are equipped to render this service. However, a compressor gun is supplied with the tool equipment of each car or truck, in case you cannot get to a Ford dealer.

To fill the compressor, remove the cap and plunger. Use a good grade of pressure gun lubricant for all bearings having the conical shaped lubricator fittings (except the universal joints), packing it solidly, avoiding air pockets. Fill only to the top of the lettering on the outside of the barrel.

When the compressor is pressed against the conical shaped fittings, the plunger moves forward, forcing the lubricant in the nozzle directly through the fitting into the bearing, under an extremely high pressure.

When the pressure on the handle is released, grasp the barrel of the compressor with one hand and draw back the handle with the other, so as to load the compressor and make it ready to deliver a charge of lubricant with the next forward thrust.

Springs

The springs should be sprayed with a penetrating oil.

Fuel Pump

Drain sediment from fuel pump by means of drain plug. In case of excessive water or sediment, drain accumulation from fuel tank also.

Cylinder Head Nuts

After the first 300 miles of operation, the cylinder head nuts should be tightened. After this tightening, they will require no further attention unless head is removed.

Tires

Air pressure in tires should be checked and sufficient air added to bring the pressure to the recommended amount. (See page 46.) Unequal tire pressure results in uneven braking action and hard steering.

Radiator

Water and anti-freeze solution in the cooling system should be checked and replenished if required.

Lights

It is advisable at this time to inspect the various lights and replace any bulbs necessary.

Battery

Each 1000 miles, or every two weeks (whichever occurs first), inspect the battery and add sufficient distilled water to bring the electrolyte to the proper level. A rapid loss of water in the battery usually is an indication of an excessive charging rate, which should be corrected. (See page 50 for complete instructions.)

Starting Motor

The bearings in the starting motor are lubricated when they are installed in the car and require no further attention.

Brake Linkage

Apply a few drops of oil to all clevis pins in the brake system.

Axle Shaft Nuts

Axle shaft nuts should be tightened after the first 300 miles of operation (truck, after first 50 miles). If car or truck is operated under severe conditions, these nuts should be tightened frequently.

Lubrication and Maintenance

Group II

Twice each year, preferably in the fall and spring, or every 5,000 miles (whichever occurs first), in addition to all the lubrication and maintenance operations in Group I, the following operations are required:

Rear Axle

Each fall and spring the lubricant in the rear axle should be drained and the housing flushed with kerosene. New lubricant should then be added until it reaches the level of the oil filler hole in the housing. Use the correct grade of lubricant to suit climatic conditions (see charts, Figs. 3 and 4).

Transmission

Each fall and spring the gear lubricant should be drained from the transmission by removing the drain plug at bottom of transmission case. The interior of the transmission case should then be thoroughly flushed with kerosene and refilled with fresh gear lubricant of the correct grade (see charts, Figs. 3 and 4).

The new lubricant is poured into the transmission through the filler hole, located at the right hand side of the transmission case. Pour sufficient lubricant in until it reaches the level of the filler hole.

Front Wheels

Twice yearly or every 5,000 miles (whichever occurs first), or at any time when the car has been operated with the front wheel inner hub cap missing, the front hubs should be removed and the bearings and the inside of the hub washed clean with kerosene and repacked with a short fibre sodium soap grease having a melting point of not less than 350° F. Complete instructions for removing the hubs are given on page 43.

Shock Absorbers

Each fall and spring or every 5,000 miles (whichever occurs first), the level of the fluid in shock absorbers should be checked and sufficient fluid added until it reaches the level of the filler plug. The correct fluid may be secured from any authorized Ford dealer. Grease or engine oil should never be added to the shock absorber.

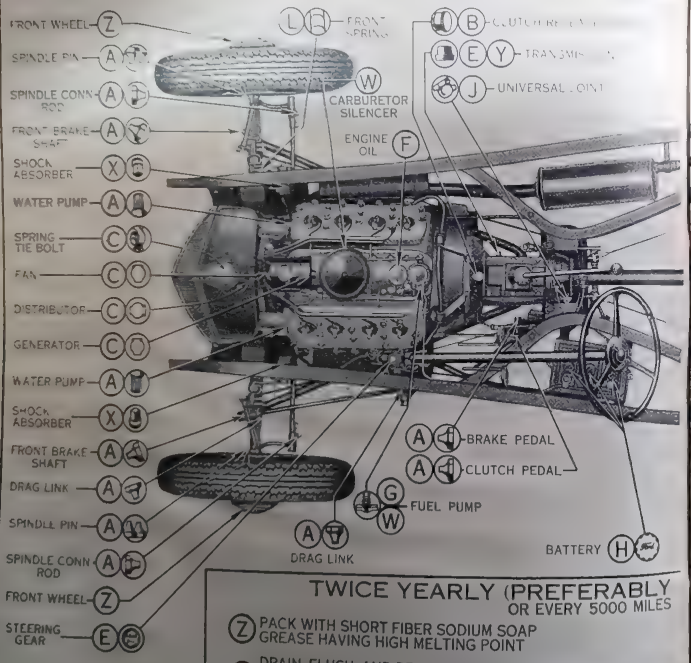
300 MILES, 1000 MILES AND

(A) PRESSURE GUN LUBRICANT

(B) ONE GREASE CUP FULL PRESSURE GUN LUBRICANT

(C) ENGINE OIL (DISTRIBUTOR SHAFT, SPRING TIE BOLT, GENERATOR DOOR HINGES BRAKE CLEVIS PINS FAN AND ACCELERATOR)

(E) ADD GEAR LUBRICANT TO LEVEL OF FILLER PLUG
S.A.E. VISCOSITY No. 110 WINTER
S.A.E. VISCOSITY No. 160 SUMMER



TWICE YEARLY (PREFERABLY OR EVERY 5000 MILES

(Z) PACK WITH SHORT FIBER SODIUM SOAP GREASE HAVING HIGH MELTING POINT

(Y) DRAIN, FLUSH, AND REFILL WITH GEAR LUBRICANT
USE S.A.E. VISCOSITY No. 110 (LOW COLD TEST) IN WINTER
USE S.A.E. VISCOSITY No. 160 IN SUMMER

EACH 1000 MILES THEREAFTER

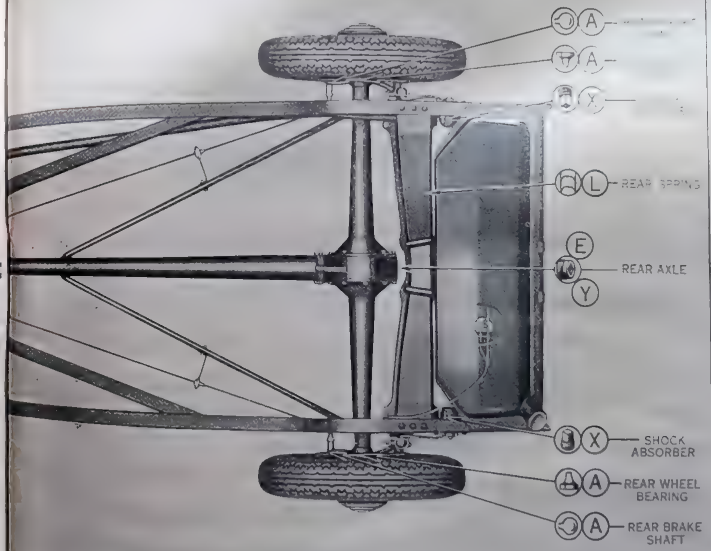
(F) DRAIN AND REFILL WITH GOOD QUALITY ENGINE OIL
USE S.A.E. VISCOSITY No. 20 WHEN BELOW FREEZING TEMPERATURES PREVAIL
(WINTER OIL MUST HAVE LOW COLD TEST)
USE S.A.E. VISCOSITY No. 40 FOR TEMPERATURES ABOVE FREEZING CHECK LEVEL EACH 100 MILES REPLENISH AS REQUIRED

(G) DRAIN SEDIMENT

(H) ADD DISTILLED WATER

(J) UNIVERSAL JOINT GREASE (CYLINDER OIL SODA SOAP GREASE)

(L) SPRAY SPRINGS (PENETRATING OIL)

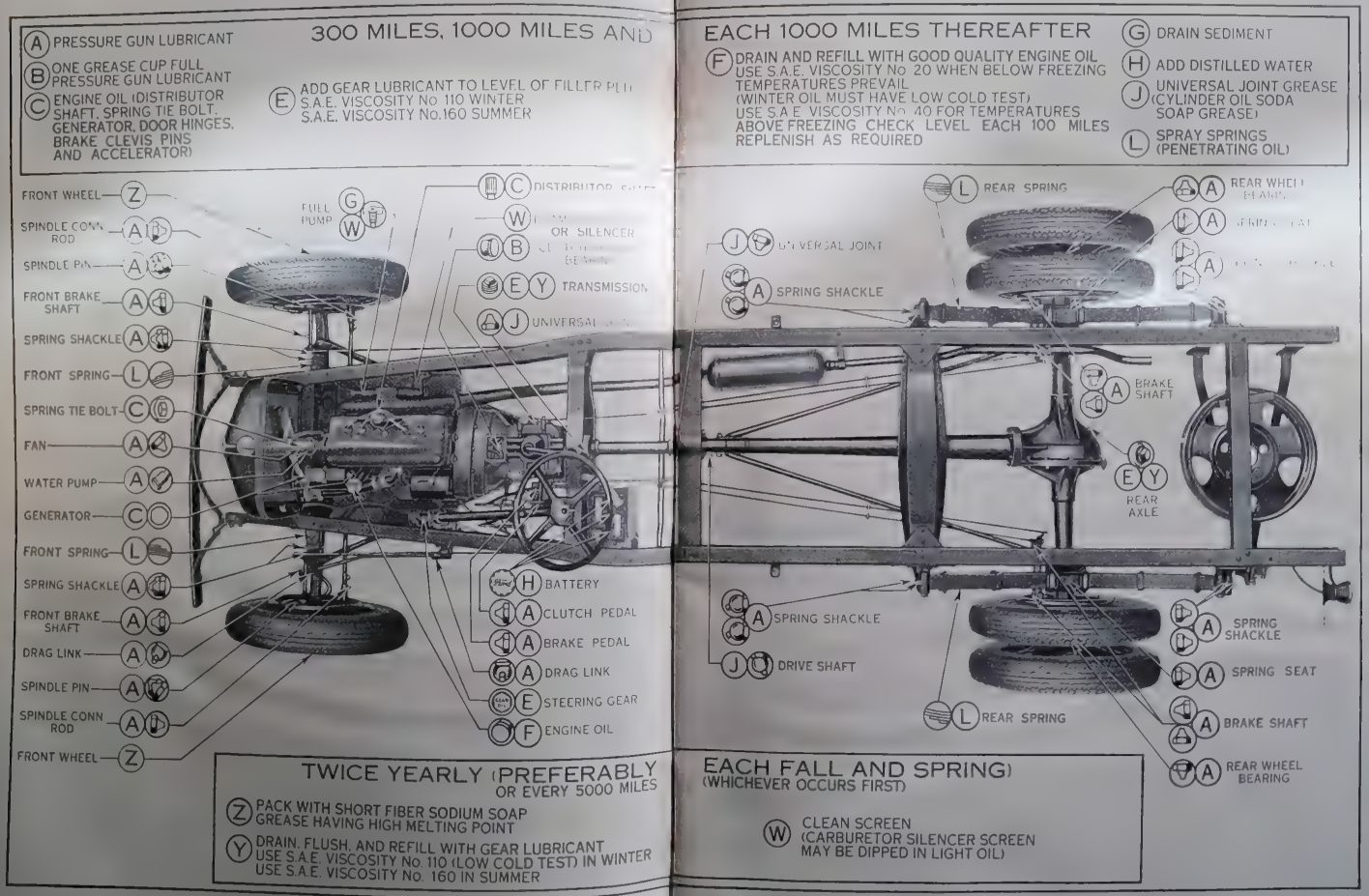


EACH FALL AND SPRING)
(WHICHEVER OCCURS FIRST)

(X) ADD FORD SHOCK ABSORBER FLUID TO LEVEL OF FILLER PLUG

(W) REMOVE AND CLEAN SCREEN (CARBURETOR SILENCER SCREEN MAY BE DIPPED IN LIGHT OIL)

Lubrication and Maintenance Chart (V-8 Car)
Figure 3



Lubrication and Maintenance Chart (4 cyl. Truck)
Figure 4

Ignition

Periodically inspect the gaps between the breaker points as well as the spark plug gaps and adjust as required.

Battery

Keep battery connections clean and tight.

Body Bolts

Inspect body bolts. If loose, they should be tightened.

Clutch

Check the amount of free travel of the clutch pedal and adjust if less than 1 inch (complete instructions are given on page 34).

Brakes

Check the movement of the brake pedal, readjusting the brakes if the pedal travels to within two inches of the floor board when the brakes are applied (see page 48).

Carburetor Silencer

Twice yearly or every 5,000 miles (whichever occurs first), the screen should be removed from the carburetor silencer and washed in gasoline. After the gasoline has dried, dip the screen in engine oil and reinstall.

Where the car is operated under dusty conditions, it may be necessary to clean the silencer oftener. Operating the car with an excessively dirty silencer will cause high fuel consumption.

Cars operated under extremely dusty conditions should have the Ford oil bath type air cleaner. Consult your Ford dealer.

Fuel Pump

Clean the fuel pump screen.

Body

A twice yearly application of Lincoln polishing wax will enhance and preserve the luster and beauty of the body and fenders.

The Engine

In the designing and building of the Ford V-8 and 4 cylinder engines, those features have been retained which were present on previous Ford engines that accounted for their efficiency, long life and world wide acceptance.

Fig. 5 shows both longitudinal and cross sectional views of the V-8 engine and clutch.

Fig. 6 shows both longitudinal and cross sectional views of the 4 cylinder engine and clutch.

In both the V-8 and the 4 cylinder engine the cylinders and crankcase are cast en bloc, assuring the permanence of the relative locations of the reciprocating parts.

The camshaft in either engine is driven by a helical cut gear on the crankshaft, thus eliminating the need of a timing chain or idle gears and the consequent adjustments.

Trouble on the Road

We have anticipated as far as possible the various combinations of circumstances which would result in difficulty with the engine being experienced by Ford owners and have incorporated in the design such features as to combat them. However, should trouble at any time be experienced, consult an authorized Ford dealer. You will find them highly efficient and with an earnest desire to serve you, and the possibility of trouble on the road will be remote. If a dealer is not readily available, a process of elimination will isolate the cause and the remedy will suggest itself.

To Operate Either Engine Requires:

A fuel system which provides a mixture of gasoline and air for the engine.

An ignition system to provide a spark at the spark plug points to ignite the fuel-air mixture.

The proper compression of the fuel-air mixture in the cylinders before ignition.

A cooling system to prevent overheating.

An oiling system to reduce frictional heat and prevent seizure of the working parts.

Each of these systems are explained in detail elsewhere in this book.

To Isolate the Cause of the Trouble, proceed as follows:

Fuel

Disconnect the fuel pump to carburetor line at the carburetor. If the cranking of the engine, either by hand or the starting motor, does not cause gasoline to flow from this line, sufficient fuel is not being supplied to the carburetor.

Should this test indicate that the carburetor is not receiving sufficient fuel, the fuel pump screen (see Figs. 8 and 9) should be examined and cleaned. If the cleaning of this screen does not correct the trouble, the fuel pump and fuel line should be examined further (see page 29).

Ignition

A spark should be produced at each spark plug once for every two revolutions of the engine, whether cranked by hand or the starting motor. To test, touch a wooden handled screwdriver to the cylinder head and the spark plug nut while engine is cranked. If a spark is not noted, the ignition system is at fault.

If a spark is noted only when the screwdriver touches the plug the spark plug gap is probably too small or the plug is shorted and should be replaced if the trouble cannot be corrected by cleaning and adjusting the gap as outlined on page 56.

If a spark occurs when the screwdriver is held $\frac{1}{16}$ inch or more away from the spark plug nut, the spark plug gap is probably too wide or the plug has a high resistance and should be replaced.

Compression.

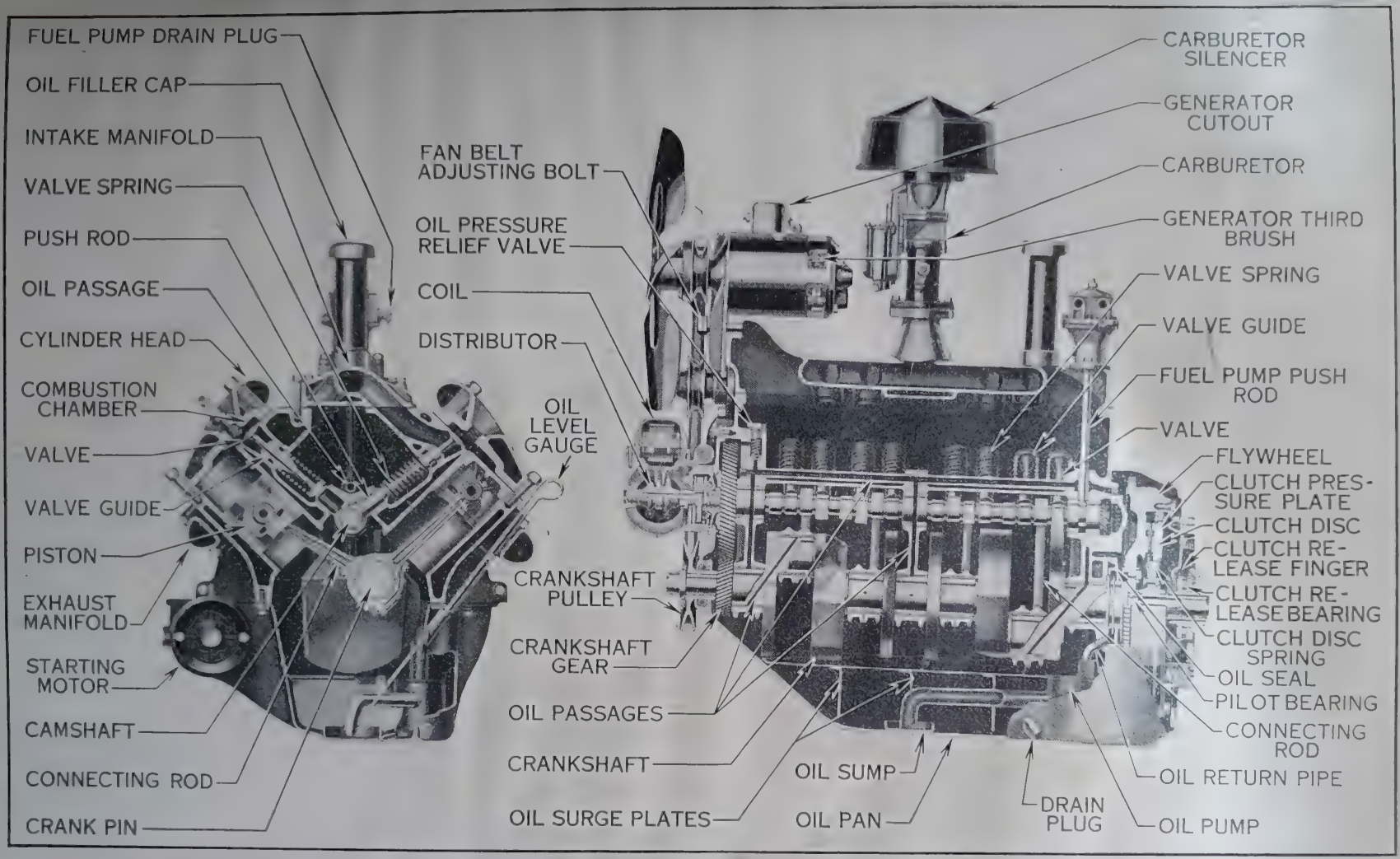
The compression of the engine can be tested by cranking the engine by hand. Crank the engine slowly noting any difference in degree of compression of each cylinder as compared with the other cylinders. Any notable difference in compression affects the operation of the engine and should be corrected.

To determine which cylinder is low on compression first acquaint yourself with the firing order of the engine.

The firing order of the V8 engine is 1-5-4-8-6-3-7-2. The cylinders in the right bank are numbered 1-2-3-4 with number one cylinder to the front. The cylinders in the left bank are numbered 5-6-7-8 with number 5 cylinder to the front.

The firing order of the 4 cylinder engine is 1-2-4-3. The cylinders are numbered 1-2-3-4. The forward cylinder being number one.

Remove number one spark plug and blocking the spark plug opening with the thumb, crank the engine until pressure is felt in number one cylinder. Then watching through the



V-8 Engine and Clutch

Figure 5

spark plug opening continue to crank until number one piston is at the top of its travel. The next cylinder, the compression of which is felt at the crank is the next cylinder in the firing order outlined above. Be sure to reinstall number one spark plug and count the cylinders as the compression of each is felt.

On the V-8 engine the compression strokes may be separated by testing 4 cylinders at a time. This can be accomplished by removing spark plugs 5-8-3-2 while testing the compression of 1-4-6-7, then reinstall the 4 spark plugs and remove spark plugs 1-4-6-7 while testing cylinders 5-8-3-2.

To distinguish between loss of compression by the rings from loss of compression by the valves, after the cylinder or cylinders which are low on compression are found, cover the top of the piston under test with oil to seal the rings and retest the compression of the cylinder. If the compression is still low the valves are at fault and probably need regrinding.

If the compression has been restored by the application of oil to the top of the piston, the trouble is with the piston rings which should be replaced.

A loss of compression only noted when engine is warm may indicate incorrect valve clearance between the valve stem and the push rod.

Valves

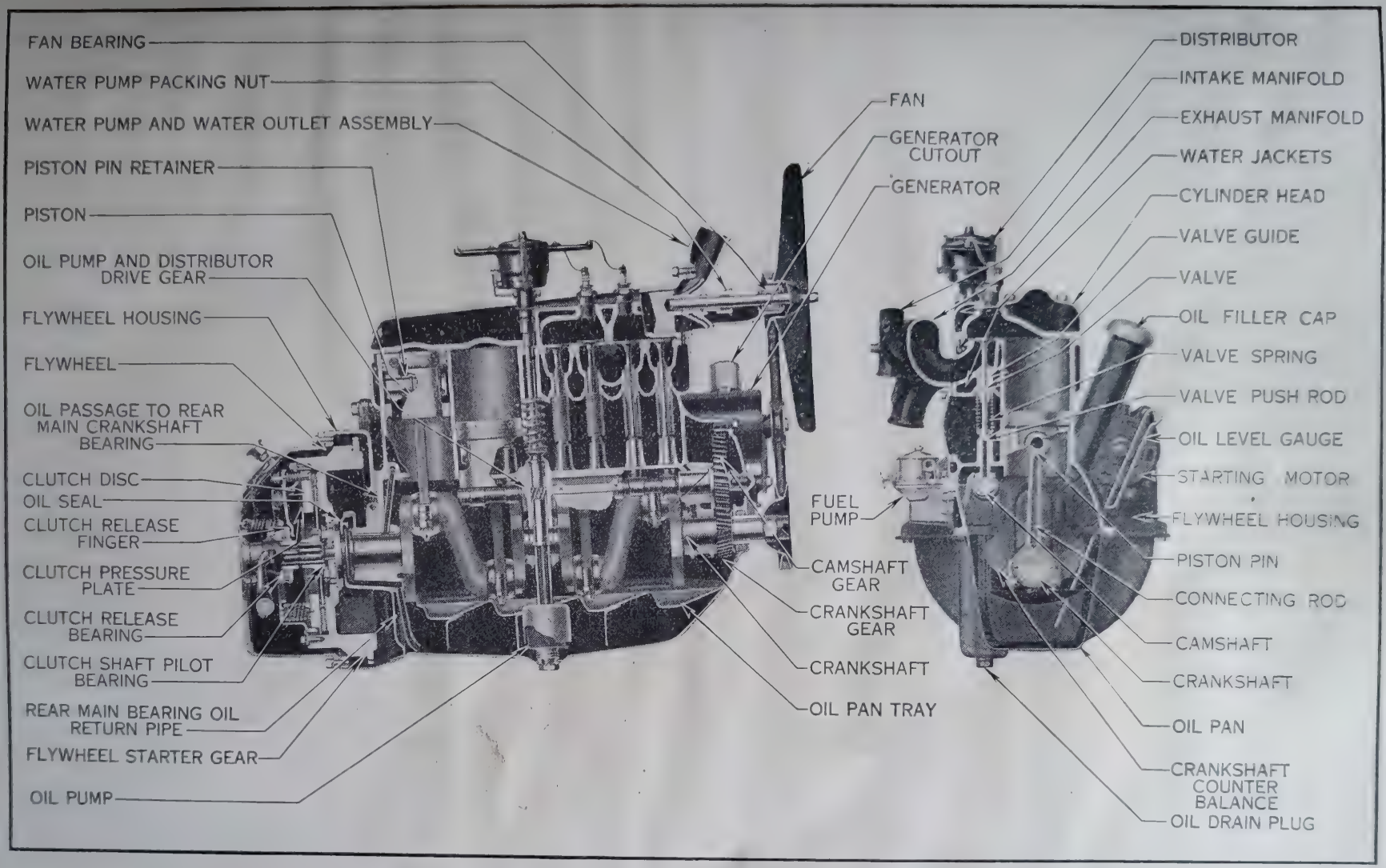
The valve clearance is accurately set beyond the maximum expansion of the valve, with the engine **cold** without the use of adjusting screws, etc. The specially developed Ford steels used in the valves make them able to withstand the high temperatures of sustained high speed without damage except where the ignition is late. Have the circuit breaker point gaps checked twice yearly or every 5,000 miles and adjusted to compensate for wear of the breaker arm.

The correct clearance for all V-8 valves is from .0125 to .0135 inch.

The correct clearance for all 4 cylinder intake valves is from .010 to .013 inch. The correct clearance for all 4 cylinder exhaust valves is from .020 to .022 inch.

Cooling and Lubrication

If the engine overheats, check the oil level in the engine and the water level in the radiator and replenish each as required. However, if the water is extremely low, **allow the engine to cool off before adding water, the sudden contraction of the cylinders, by the cold water, may crack them.**



4 Cylinder Engine and Clutch

Figure 6

The Cooling System

The Ford engines are cooled by a circulation of water through the water jackets which surround the cylinders, combustion chambers, and valve seats. The water is circulated by thermo-syphon action, the flow of water being accelerated by means of centrifugal water pumps located at the front of the cylinder heads.

As the proper cooling of the engine is dependent upon the water supply, it is important particularly with a new car to see that the radiator is kept well filled.

Cleaning the Cooling System

The entire system should occasionally be flushed out. To do this, open the drain plugs and insert a hose into the radiator filler neck, allowing the water to flow through the system for about fifteen minutes or until the water comes out clear.

On the V-8 engine two drain plugs are provided one on each bank of cylinders at the front to the rear of the water inlet connections. **Never use caustic alkali radiator cleaners in the V-8 cooling system as they have a very injurious effect on the aluminum cylinder heads.**

On the 4 cylinder engine a drain plug is provided in the water inlet connection.

Care of the Cooling System in Winter

In freezing weather it is necessary to use a suitable anti-freeze solution in the system to prevent freezing of the water.

Alcohol, Radiator Glycerine or Ethylene Glycol solutions are satisfactory to use as an anti-freeze.

Salt solutions such as calcium or magnesium chloride, sodium salicylate, etc., honey, glucose and sugar solutions, and oils are not satisfactory for use in the cooling system.

Before adding anti-freeze solution to the cooling system it is important that the entire system be thoroughly flushed as outlined above. Cylinder head gaskets must be in good condition and kept tight at all times to prevent the solution leaking into the crankcase where it may cause gumming and sticking of the working parts of the engine.

Evaporation or mechanical loss may weaken your anti-freeze solution, consequently they should be tested frequently, especially in severe weather.

Either Ethylene Glycol or Radiator Glycerine used as an anti-freeze must contain effective inhibitors designed to control corrosion.

Lacquers are softened by alcohol and it is therefore extremely important that every precaution be taken to avoid spilling alcohol on any of the painted surfaces of the car. If this should accidentally occur the surface should be immediately flushed with a large quantity of water.

Suitable anti-freeze solutions can be obtained from any authorized Ford dealer, also complete directions as to the percentage of solution to be used to withstand the various low temperatures.

Adjusting the Fan Belt on V-8 Engine

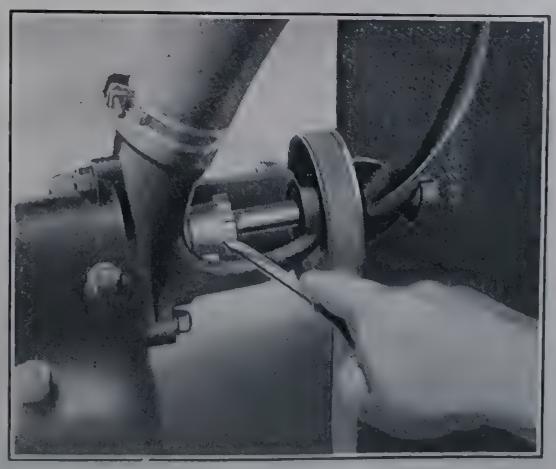
The fan, water pumps, and generator are operated by the same "V" shaped belt. The adjustment is made by loosening the generator support clamp bolt (see Fig. 5) and moving the generator upward. The proper adjustment is so that there is ¾" to 1" movement of the belt at a point halfway between water pump and crankshaft pulley.

Adjusting the Fan Belt on 4 Cylinder Engine

The fan and water pump both operate from the same shaft. The shaft is driven by a "V" shaped belt. The adjustment is easily made by loosening the generator support to engine screw and moving the generator toward you. Do not tighten belt more than is actually necessary to keep it from slipping.

4 Cylinder Water Pump Packing Nut

Packing is used in forming a watertight connection around the water pump shaft. Should a leak develop, lubricate water pump shaft through water pump lubricator fitting, then tighten the packing nut. A screwdriver is used for this purpose, as shown in Fig. 7. Do not tighten the nut more than is necessary to stop the leak.



Adjusting Water Pump Packing Nut
Figure 7

Fuel System

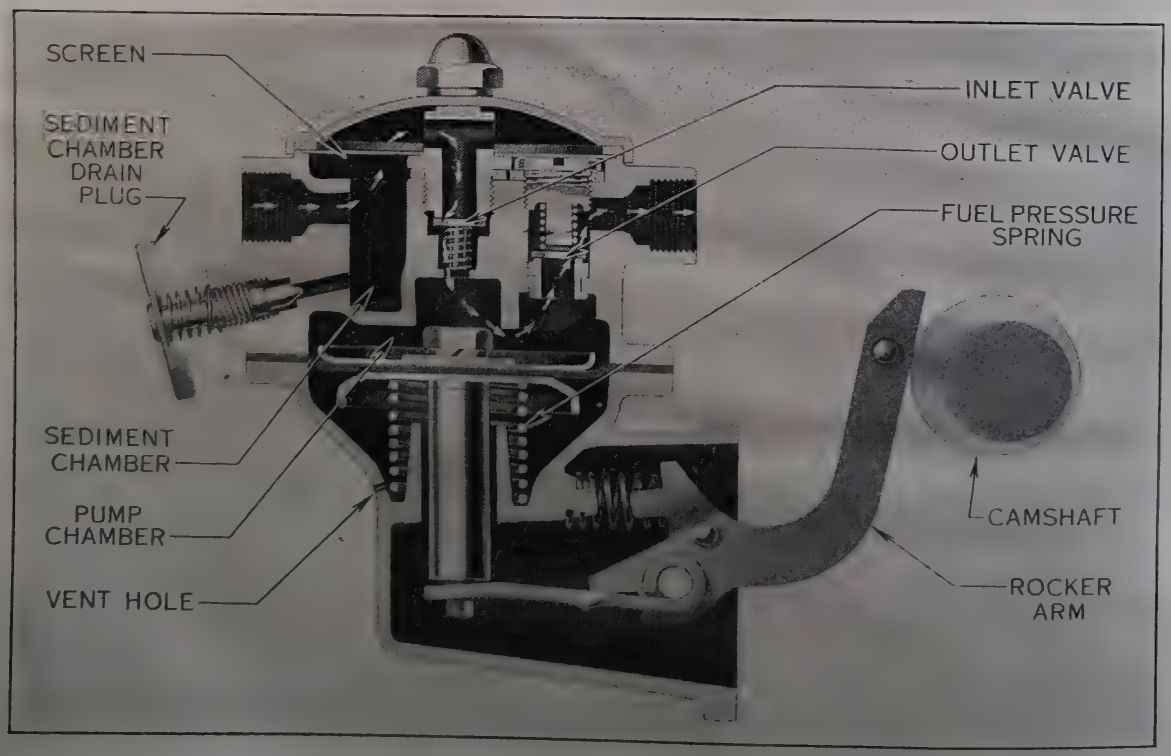
Gasoline Gauge

The hydrostatic fuel gauge mounted on the instrument panel is operated by pressure of the gasoline on air trapped in an air bell submerged in the tank. Being self-correcting and entirely automatic in action, it requires no attention other than the keeping of the fuel gauge line connections tight and free from obstructions.

Fuel Pump

The fuel pump is driven by an eccentric on the camshaft (see Figs. 8 and 9). It draws the gasoline from the tank and supplies it to the carburetor. Being automatic in action, the pump requires little attention other than to keep it free from dirt and keep all connections tight.

The construction of the pump is such as to provide a trap for sediment or water which can be drained off by means of the drain plug on the side of the pump.



Fuel Pump (4 Cyl. Engine)
Figure 8

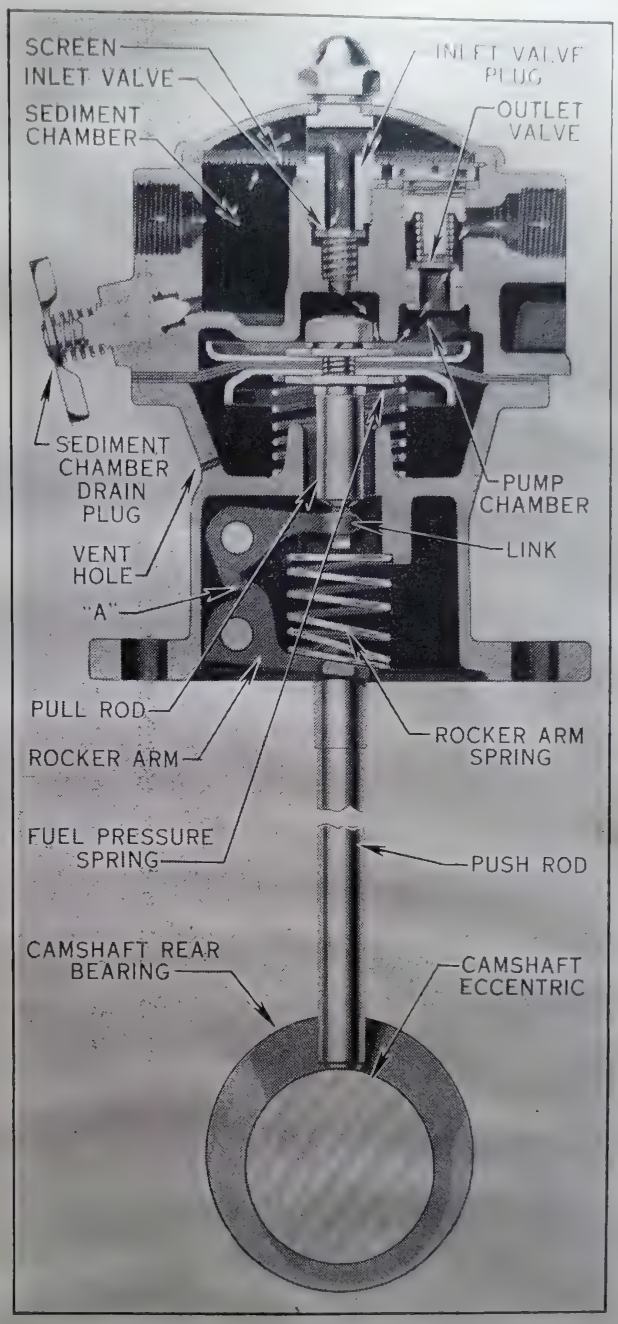
Trouble

If at any time the carburetor is not receiving sufficient gasoline one of the following is likely to be the cause:

(1) Fuel tank is empty.

(2) Screen has become fouled with sediment, in which case it should be cleaned.

(3) The gasoline line or its connections have a leak at some point, permitting the entrance of air to the line. The remedy, of course, being to stop the leak, at which time the pump will prime itself and again function properly. Cranking the engine for 20 seconds with the starter should prime the pump. **An air leak is sometimes caused by the sediment chamber drain plug not being properly seated. Tighten drain plug to correct.**



Fuel Pump (V-8 Engine)
Figure 9

(4) If at any time gasoline is seeping through the vent hole shown in lower half of fuel pump (see Figs. 8 and 9) it is probably an indication of the diaphragm in the pump having become worn. While this does not usually render the pump inoperative immediately, it is advisable to replace the diaphragm as soon as possible. Ford dealers carry these parts in stock and it is recommended that you consult them should repairs be required.

Carburetor—V-8 Engine

The carburetor used on the V-8 engine is of the down draft type with accelerating pump, sleeve valve choke, and air vane operated main fuel supply jet. The carburetor is entirely automatic in action. All adjustments are made at time of manufacture and with the exception of the idling adjustment will remain permanently correct unless tampered with. The idle adjustment should be readjusted after the breaking in period. Your Ford dealer will make this adjustment when you return your car or truck for inspection after the first 300 miles of operation.

It is not necessary to pull out the throttle button when starting the engine as the throttle automatically opens the correct amount for starting when the choke button is pulled out.

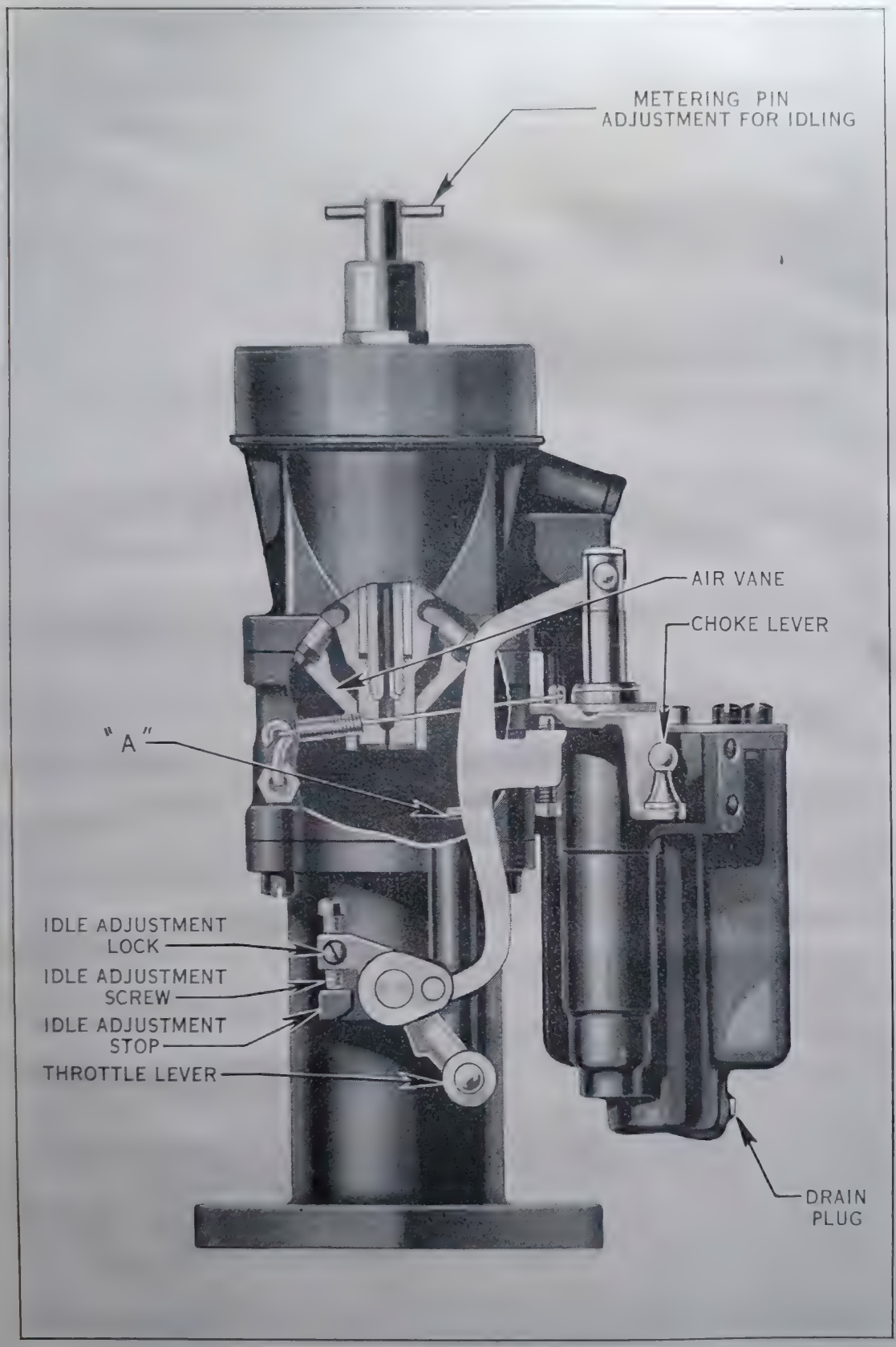
The accelerating pump in the carburetor is controlled by the accelerator pedal. Quick downward pressure on this pedal causes a spray of fuel to be injected into the carburetor throat for maximum acceleration. **Avoid depressing this pedal rapidly if the engine should stall when warm as this spray may flood the engine and make restarting difficult.**

The choke valve is controlled by the choke button located on the instrument board at the right. Pulling the button out closes the choke valve in the carburetor permitting a rich gasoline mixture to be drawn into the cylinders for **cold weather starting.** The richness of the mixture is in direct proportion to the extent to which you pull the choke button out. **The engine should never be operated with the choke button pulled out after it has warmed up.**

Adjustment

The idle speed of the engine should be set by means of the throttle plate adjusting screw (see Fig. 10) to a speed equivalent to five miles per hour.

When the metering pin is correctly adjusted at idle speed the carburetor is set for maximum engine performance and usually no other adjustments are required.



Carburetor (V-8)
Figure 10

Metering Pin Adjustment

Normally, only one adjustment of the V-8 carburetor is required, this adjustment being the fuel adjustment for idling. The metering pin is raised or lowered by screwing it into or out of the fuel orifice. **Be sure the engine is well warmed up,** and there are **no air leaks** at manifold (tighten screws) or windshield wiper or distributor vacuum line (tighten connections), then remove the carburetor silencer, adjust the metering pin carefully **at idle speed.**

Screw the adjustment down until the performance of the engine indicates that the mixture is too lean (speed of engine will decrease), then turn it back slowly, (allowing 30 seconds at each setting to note the performance of the engine) until the engine performance is again smooth (speed will increase slightly).

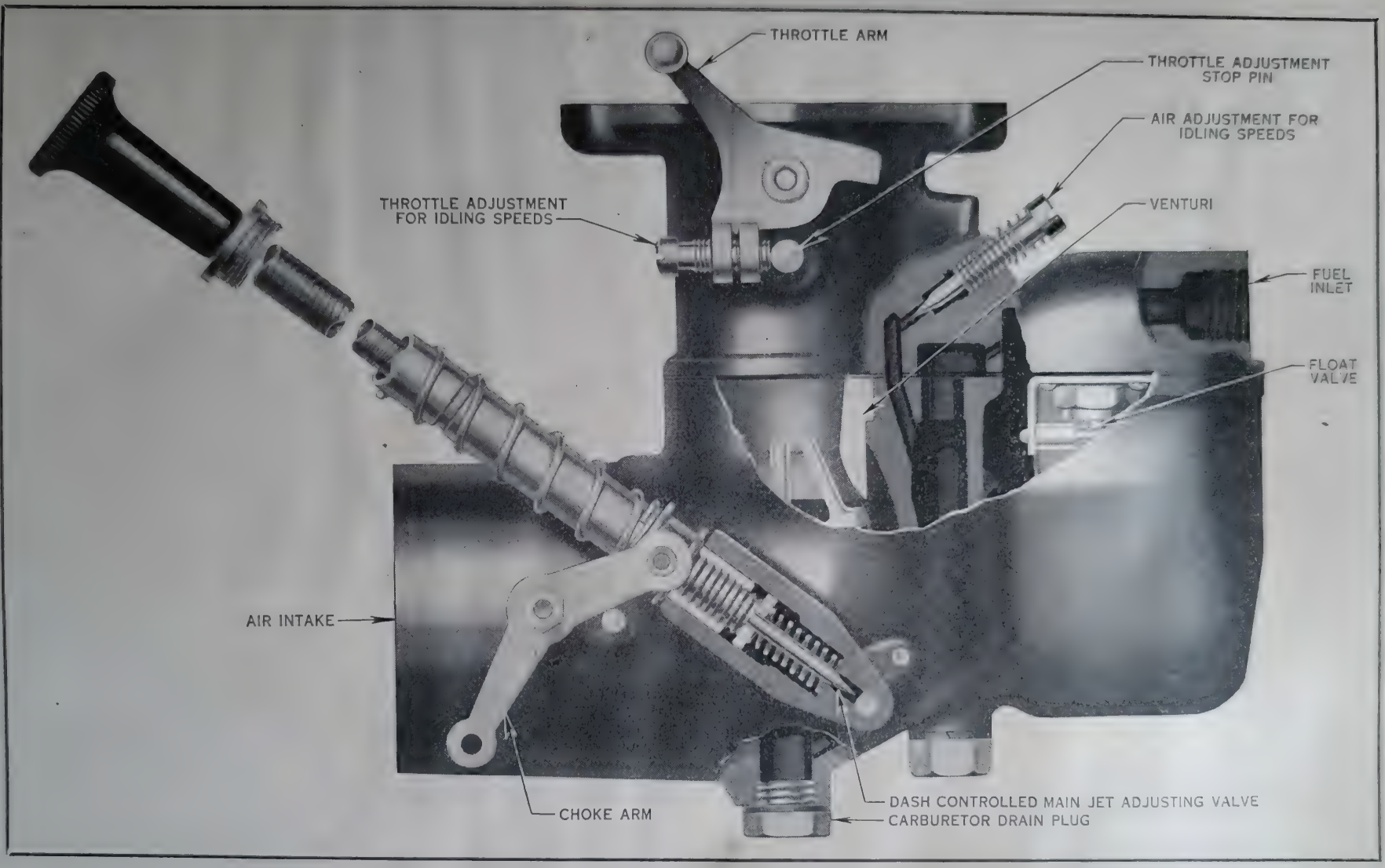
Carburetor—4 Cylinder Engine

The carburetor used on the Ford 4 cylinder engine is entirely automatic in action, assuring a correctly balanced air and fuel mixture at all speeds. This is accomplished by the use of a series of jets cutting in at various speeds.

With the exception of the needle valve and idle adjustment, all of the carburetor adjustments are fixed, about the only thing that could affect the carburetor would be dirt or water getting into it. An occasional cleaning will insure uninterrupted service. To clean the carburetor, remove the drain plug at the bottom and drain for a few seconds.

Regulating Gasoline Mixture

The pulling out of the choke button (located on the instrument panel) closes the choke valve in the carburetor, permitting a rich gasoline mixture to be drawn into the cylinders for cold weather starting. When released, this button is returned to normal position by spring action.



Carburetor (4 Cylinder)
Figure 11

This button is also a carburetor needle valve adjustment. Turning the button in a counter clockwise direction enriches the fuel and air mixture. The valve should be turned back (clockwise) as soon as the engine has become warm. **The engine should never be operated with this adjustment open.**

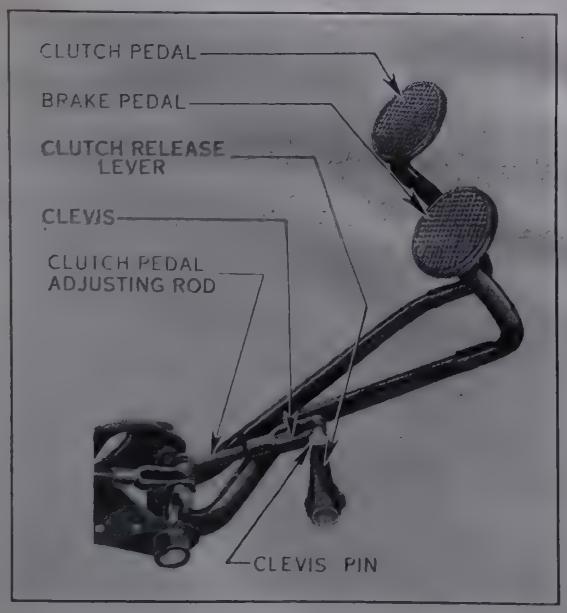
Turning the carburetor adjustment too far to the left results in a "rich mixture." Such a mixture has too much gasoline and should be used for starting and warming up only. Running with too rich a mixture causes excessive carbon and overheating, likewise it wastes fuel.

To Set Idle Adjustment Proceed as Follows:

With engine warmed up, push in throttle button on instrument panel. Adjust throttle plate adjusting screw so that the engine will run sufficiently fast to keep from stalling. Next turn idling air adjustment screw in or out until engine runs evenly without rolling or skipping. (Usually from 1¼ to 1¾ turns open is correct.) Then slowly screw in throttle plate adjusting screw until engine picks up a slight additional speed.

The Clutch

The clutch on the Ford cars and trucks is of single plate, dry disc type, operated by the foot pedal. The clutch is the medium through which the power of the engine is delivered to or cut off from the transmission.



Clutch Pedal Adjustment
Figure 12

Figs. 5 and 6 illustrate the arrangement of the component parts of the clutch as used on the V-8 and 4 cylinder engines.

Adjustment

The clearance between the clutch release bearing and the clutch plate release fingers must be maintained at all times and is indicated by the amount of free travel of the clutch pedal. As the clutch disc facings become worn, it will be necessary to adjust this clearance. The correct adjustment is when the clutch pedal has from one and one-quarter

to one inch free movement. This adjustment is easily made by removing the clevis pin (see Fig. 12) and turning the release arm rod. Screwing the rod out decreases the clutch pedal free movement. Screwing the rod in increases the amount of free movement. After making the adjustment, be sure to replace the clevis pin and cotter key. It is recommended that an authorized Ford dealer make this adjustment should it in time be required.

Abuse

Driving with your foot resting on the clutch pedal, commonly referred to as "riding the pedal," will result in excessive wear of the release bearing and clutch disc facings, and necessitate frequent adjustment and may in time necessitate reconditioning of the clutch.

Transmission

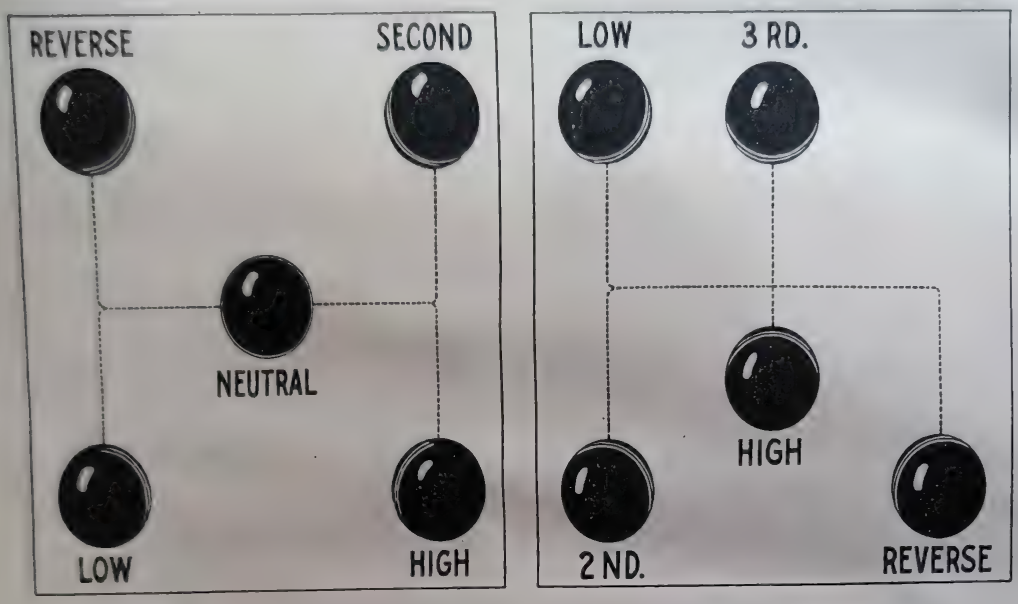
The Three Speed Transmission in the Ford commercial car is of the selective sliding type, with silent running constant mesh gears in second speed, all gears used in second speed having helical teeth to insure their quiet operation.

A synchronizer is used in the three speed transmission to insure quiet and easy gear engagement between high and second gear. Fig. 14 shows the transmission used in the car. Portions of the case and the gears have been cut away to better illustrate the various gears, synchronizer, bearings, etc., used. The reverse idler gear has been drawn semi-transparent to permit the countershaft reverse gear, which is on the other side of it, to be shown.

Fig. 15 illustrates the **four speed transmission** used in the Ford 1½ ton chassis.

In either transmission, when the gear shift lever is in high speed position, the drive is direct. The power is transmitted entirely on roller or ball bearings in all forward speeds and, with the exception of the reverse idler gear, in reverse gear also.

The Synchronizing Device used in the three speed transmission makes shifting smooth, quiet and almost effortless. It



Three Speed Transmission Four Speed Transmission

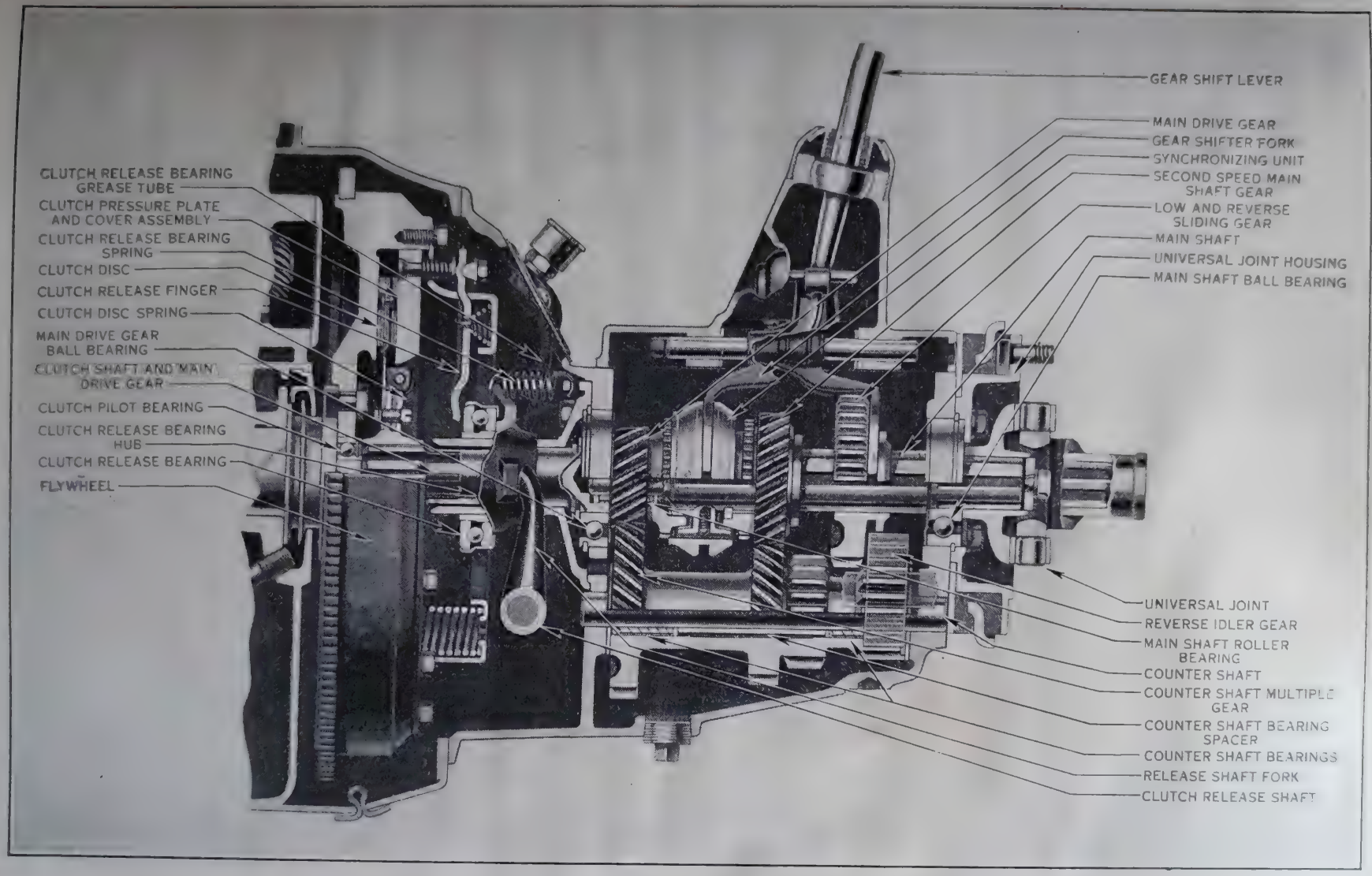
Gear Shift Lever Positions

Figure 13

consists of a hub and ring. Teeth on the inside of the ring mesh with teeth on the outside of the hub at all times. In neutral position, the central location of the ring on the hub is maintained by six steel balls, held in a groove in the ring by springs. The hub is built with a bronze section on each side which fits the conical steel flange on either second or high gear. When a shift is made to either high or second speed, the synchronizing device moves as a unit until the bronze section of the hub contacts the conical flange of the gear. Acting as a conical clutch, the speed of the two is synchronized or made uniform and, as the shift is completed, the internal gear or ring of the synchronizer unit is released from its centrally located position on the hub and the teeth engage in the teeth of the high or second speed gear. As the two are rotating at the same speed, the meshing of these gears is effected without clashing of the teeth.

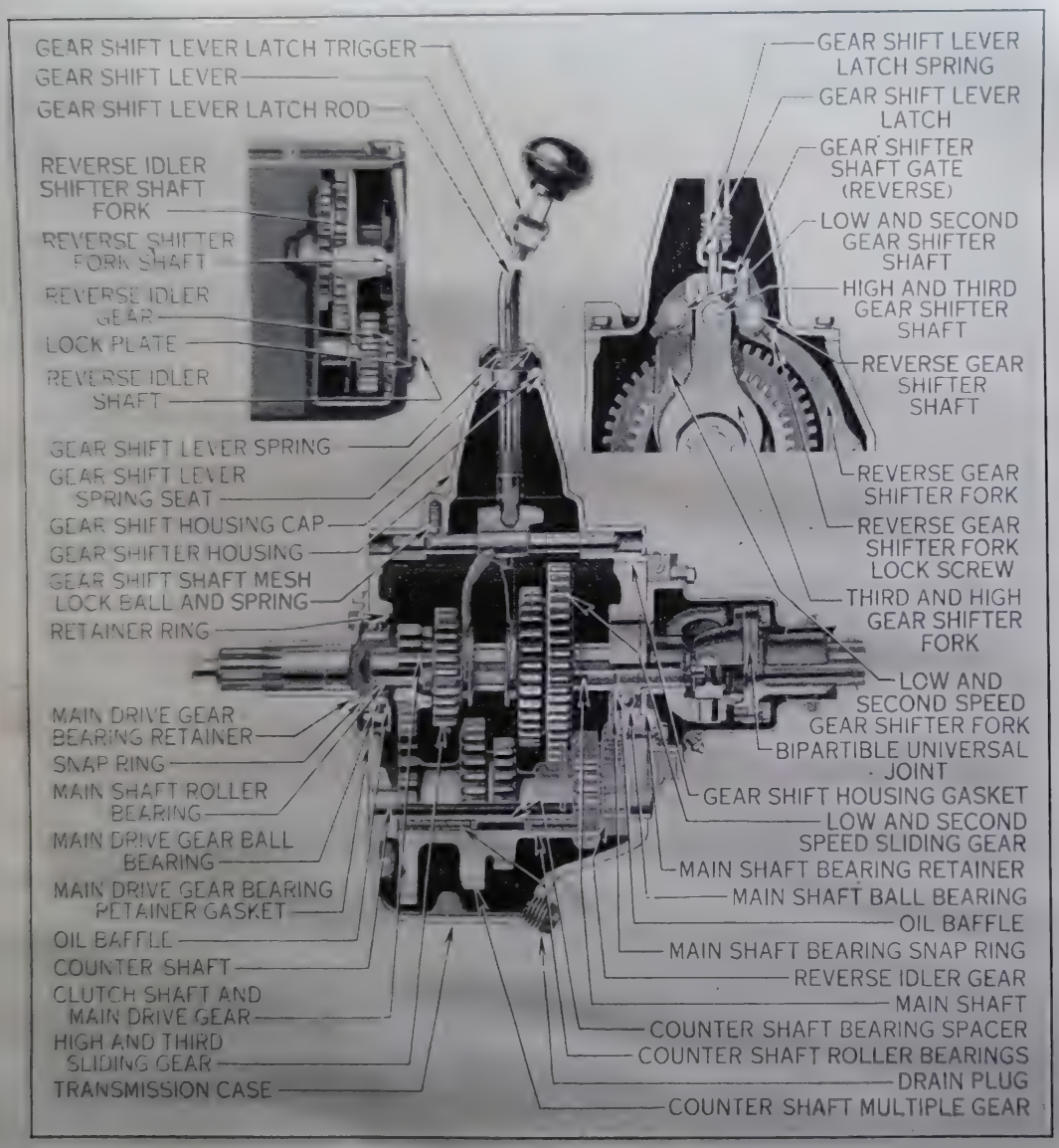
Care

Only a fluid gear lubricant should be used in the transmission, the level of which should be maintained at the height of the filler hole, located on the side of the transmission case.



Three Speed Transmission

Figure 14

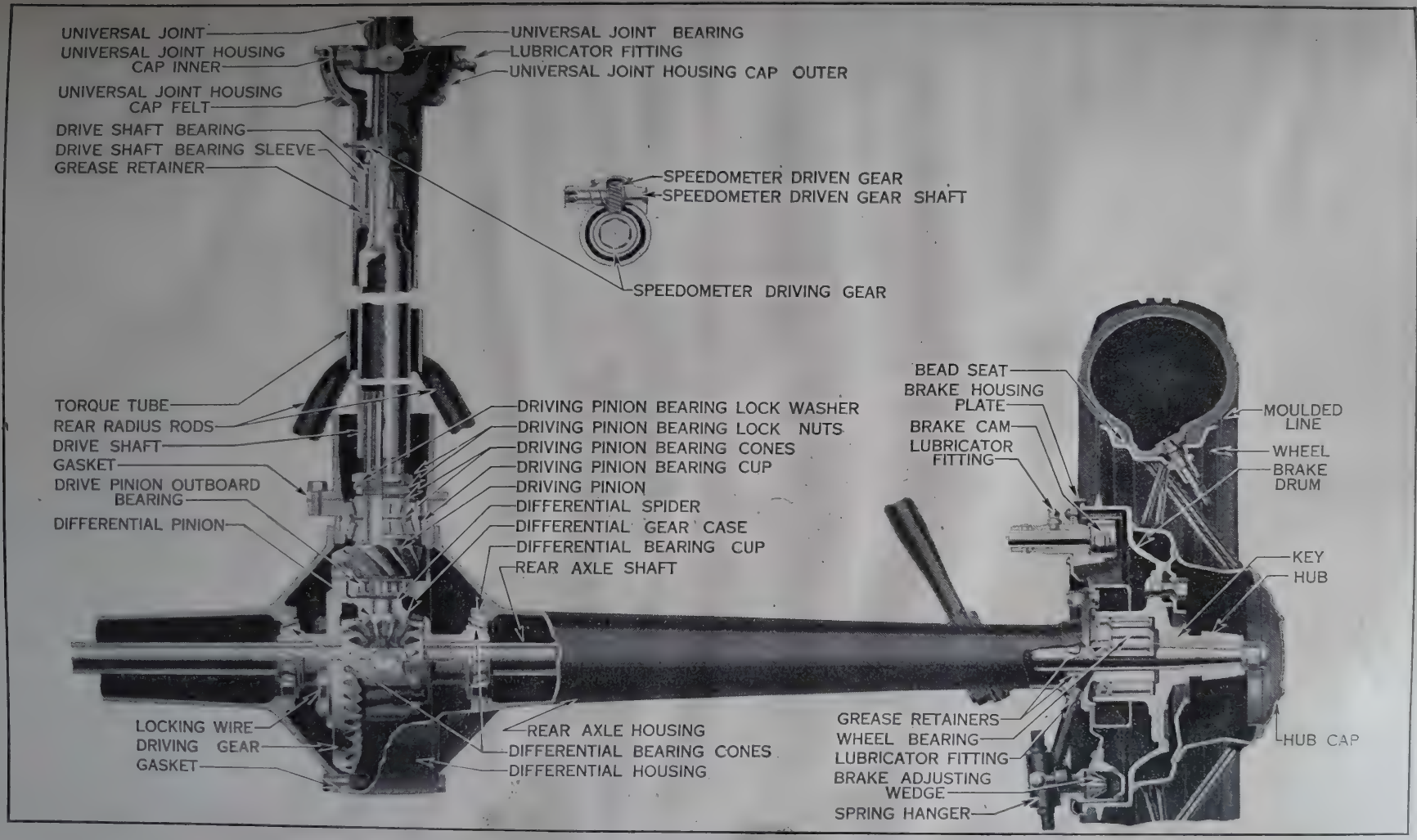


Four Speed Transmission

Figure 15

Releasing of the clutch when starting the motor will decrease the draw on the battery and assist starting, particularly in cold weather.

The gear shift lever should always be in neutral position when starting the motor. Gear shift lever positions are illustrated in Fig. 13.



Rear Axle (Car)
Figure 16

The Rear Axle

The power is transmitted to the rear axle from the transmission by means of a universal joint and a drive shaft running on roller bearings.

The Coupling Shafts used on 131½ inch and 157 inch wheelbase chassis are so designed as to be readily removable, permitting access to the universal joints, etc., without disturbing other units of the chassis. This feature, in conjunction with the removable cross member on frames, facilitates the servicing of the transmission and clutch.

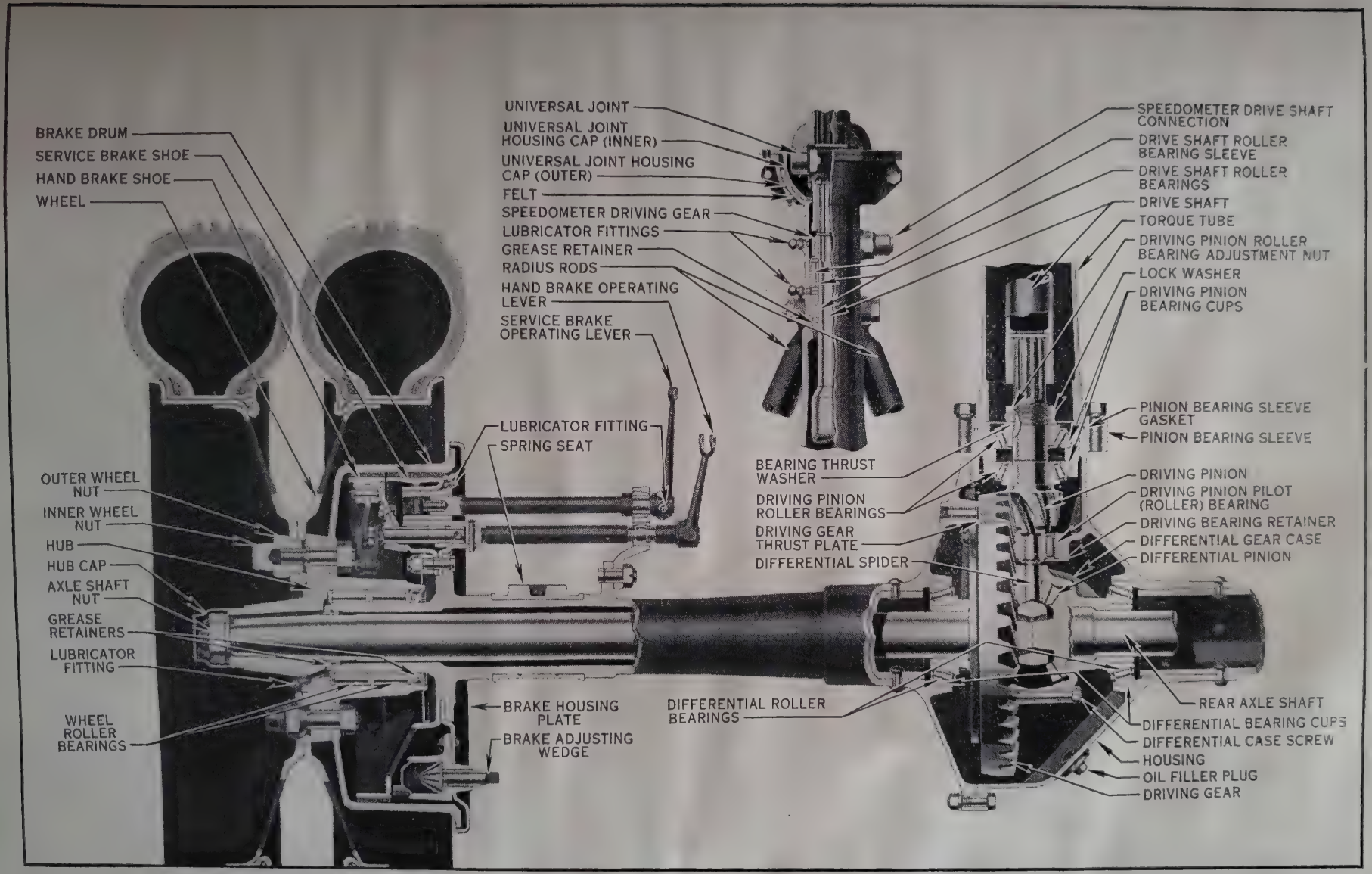
On both commercial car and truck axle the load is carried on the axle housing, thus freeing the axle shafts of all strain other than the actual transmission of power. All road thrust is delivered through a torque tube to the frame. Owing to the high degree of accuracy obtained by the use of special Ford developed machinery, the various dimensions of the component parts of the axle are held to such fine limits that adjustments are not required. Gear back lash and bearing clearances are permanently correct.

The axle shaft nut, which holds the hub in place, should be kept tight at all times to prevent damage to the taper on either the axle shaft or hub. This is particularly true for the 1½ ton truck. **Tighten these nuts after the first 50 miles of operation.**

Lubrication of the rear axle is completely covered on pages 12 and 15.

Fig. 16 shows the rear axle used on the ½ ton chassis. Fig. 17 shows the rear axle used on the 1½ ton chassis.

Repairs on either should not be attempted by the layman. Authorized Ford dealers are equipped and trained to render this service.

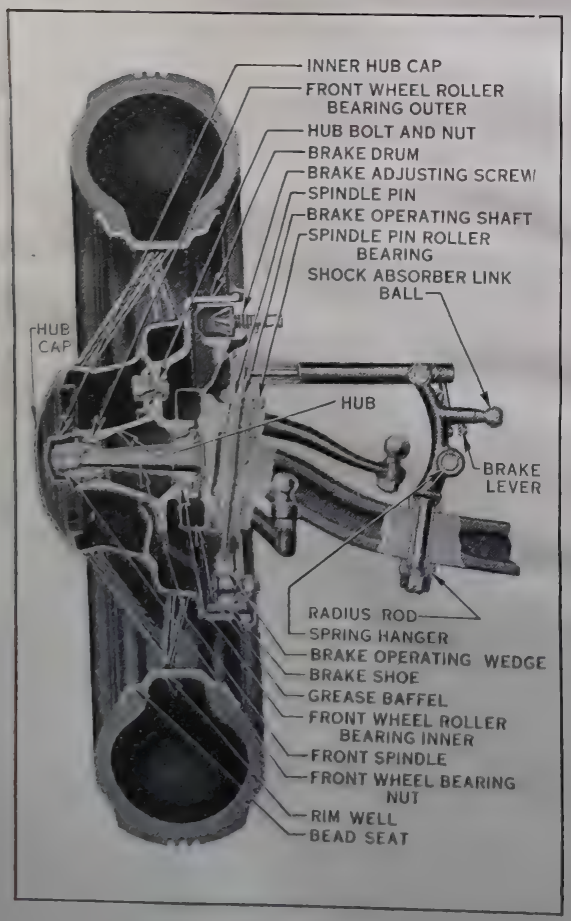


Rear Axle (Truck)
Figure 17

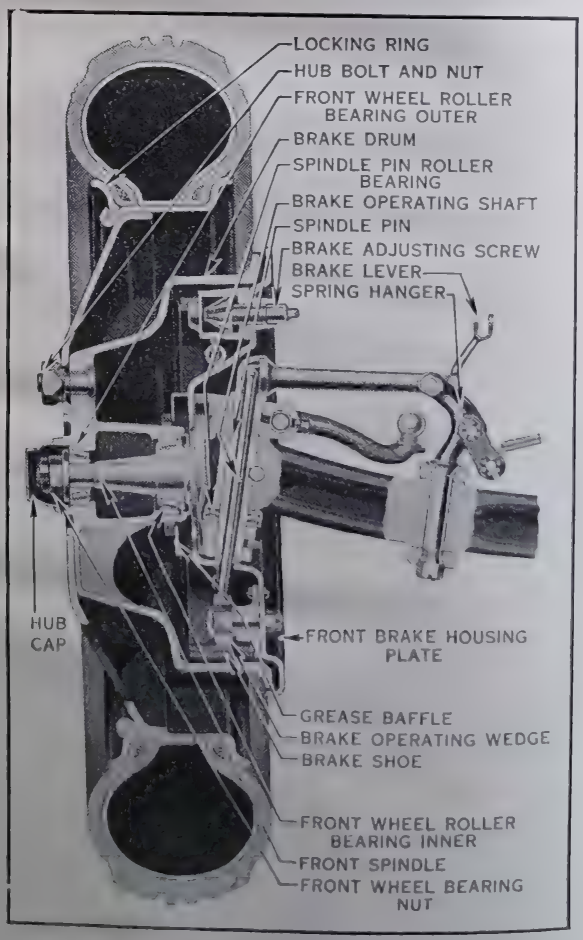
The Front Axle

The front axle of the Ford car or truck is so designed as to afford maximum safety at either high or low speeds on rough roads or pavements. The axle is held in position by a radius rod pivoting on the frame cross member. This method of mounting holds the axle in the correct position with regard to brake rods, steering connections, and spindle pin inclination at all times regardless of the road or speed of the car. In normal service the only attentions required are lubrication and the correct adjustment of the various steering connections. It is recommended that these adjustments when required be made by an authorized Ford dealer.

The front axle should be jacked up periodically and tested for smoothness of running and excessive side play. To determine if there is excessive side play, grasp the sides of the tire and shake the wheel. Do not mistake loose spindle bushings



Commercial Car



1½ Ton Truck

Front Axle
Figure 18

for loose bearings. Insert a wedge between spindle and axle when making this test to take up any spindle bushing play. If the spindle bushings have become worn sufficiently to warrant it, they should be replaced. Consult a Ford dealer.

Adjusting Front Wheel Bearing. If there is excessive play in the bearing it can be adjusted as follows:

Remove the front wheel.

The hub cap may now be removed by turning in a counter-clockwise direction. By removing the cotter key the front wheel bearing nut, bearings and hub may be removed or adjusted.

When reassembling or adjusting the adjusting nut should be run up tight and then turned back approximately ¼ turn and the cotter pin replaced. On the car both the inner and outer hub caps should again be installed. Never operate either car or truck with the front hub caps missing.

Wheels

To remove drop center wheels jack up the side of the axle from which the wheel is to be removed. With a screw driver remove the hub cap. With the wrench incorporated in the starting crank remove the five hub bolt nuts. The wheel can then be removed.

When replacing the wheel, tighten each hub bolt nut a few turns at a time. Then follow around the hub, tightening each nut firmly. If nuts are not drawn up evenly, the wheel will not run true.

Mounting Disc Wheels

It is very important that truck wheels be correctly mounted. The following instructions should be carefully observed. In mounting hubs, or in replacing studs or nuts, right-hand studs must be used on right side of chassis and left-hand on left side. **Right** and **left** sides are seen from the driver's seat facing forward. All studs and nuts are plainly marked "R" and "L" and must be so used. Right-and left-hand threads are used on all assemblies to insure wheel nuts staying tight when the truck is operated in deep mud etc.

Wheels must be clean. Always examine wheels before mounting on hub to be sure that countersunk holes, where ball face of wheel nut seats, are free from dirt, and face of disc and hub flange, where they bear together, must be clean. The same applies to the surfaces of both rear duals where the two come together. Presence of foreign matter will prevent proper bearing and create high spots which are likely to cause loose fits, play and wear. Watch this point, particularly in mounting spare wheels, which may have picked up road dirt. The countersunk holes should be carefully cleaned.

Dual wheels are of the double cap nut type. The inner dual wheel is individually held by the sleeve-shaped inner wheel nut to insure positive drive and tire alignment. The inner wheel must be mounted and tightened before the outer wheel is put on. The outer wheel slips over the inner wheel nuts and is independently held by the outer nuts. The front, or single wheel, is held by a single set of nuts.

Nuts should be tightened with the truck **jacked up.** Outer wheel nuts must be backed off at least two full turns to tighten inner nuts. **These nuts must not be neglected.** In mounting wheels or tightening nuts, proceed in a criss-cross fashion and not around the circle.

Do not use an extension on the regular wrench handle as supplied. Ordinary pressure as exerted in tightening cap nuts with the handle is sufficient to drive wheel nuts home, without use of an extension.

Tighten all wheel nuts at the end of the first fifty to one hundred miles on a new truck.

Axle shaft nuts must also be kept tight at all times.

Tires

To Remove Tire from Drop Center Wheels

(1) Deflate the tube completely.

(2) Remove the valve cap and valve lock nut.

(3) Loosen both beads from the bead seats.

(4) Force the outside bead from the bead seat into the rim well at a point opposite the valve.

(5) With two tire tools placed approximately four inches on each side of valve lift the bead over the rim flange (see Fig. 19).

(6) Follow around the flange with the tools until the outside bead is free from the rim.

(7) Force the inside bead into the rim well at the top.

(8) Pull out bottom of the tire until it swings clear, as shown in Fig. 19.

To Mount Tire on Drop Center Wheels

(1) Inflate the tube until barely rounded out and insert in tire. The tires are marked with a red dot to insure correct balance. The tube must be placed in the tire with the valve stem at point marked.

Caution: Never use a tire flap. Use only tires having balancing dot and moulded line for centering on the wheel.

(2) Place the tire on the wheel, guiding the valve through the valve hole.

(3) Push the inside bead into the rim well at a point next to the valve.

(4) Force the remaining portion of the bead over the outside flange of the rim. If a tire tool is used, do not attempt to force too large a portion over the flange at one time.

(5) Apply the valve lock nut loosely.

(6) Lift up on the tire, placing the outside bead in the rim well at the valve.

(7) Starting at either side of the valve, force short lengths of the bead over the flange, continuing around the wheel until the entire bead is in place. Always keep as much of the bead as possible in the rim well while applying.

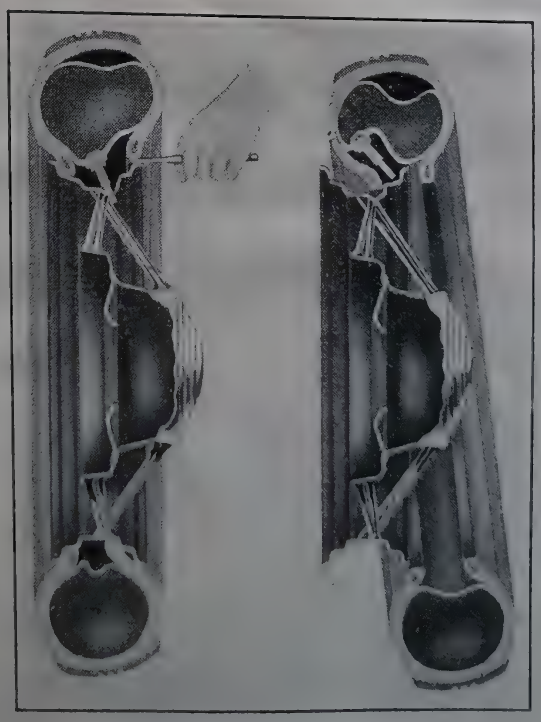


Figure 19

(8) Before inflating, remove the valve lock nut and push the valve stem into the casing as far as possible to make certain that the tube is not pinched under the tire bead. Do not let go of the valve stem while doing this.

(9) Reapply rim nut, and inflate the tube to not more than two pounds pressure, working casing back and forth to insure proper setting of the tire. The proper setting is indicated by the moulded line (see Fig. 16) on the tire being equally spaced from the rim at all points.

(10) Inflate the tire to recommended pressure.

With Ford steel spoke drop center wheels, tires can be more easily changed with wheel mounted on axle or tire carrier than by laying the wheel on ground.

Truck Tires

Ford disc wheels are provided with a locking ring (see Fig. 18). Care should be exercised when removing or installing tires so as not to distort the locking ring.

Tire Pressures

Tires should never be run partially inflated, as the side walls are unduly bent and the fabric is subjected to stresses which cause what is known as rim cutting. Keep tires inflated as follows; **check once a week.**

5.50 x 17 tires	35 pounds pressure.
6.00 x 20 tires	45 pounds pressure.
6.50 x 20 tires	50 pounds pressure.
32 x 6 tires (8 ply, truck type)	80 pounds pressure.
32 x 6 tires (10 ply, heavy duty)	90 pounds pressure.
32 x 7 tires	100 pounds pressure.

The air pressure in the tire has a very pronounced effect on the action of the brakes, as well as the correct operation of the front wheels and steering gear.

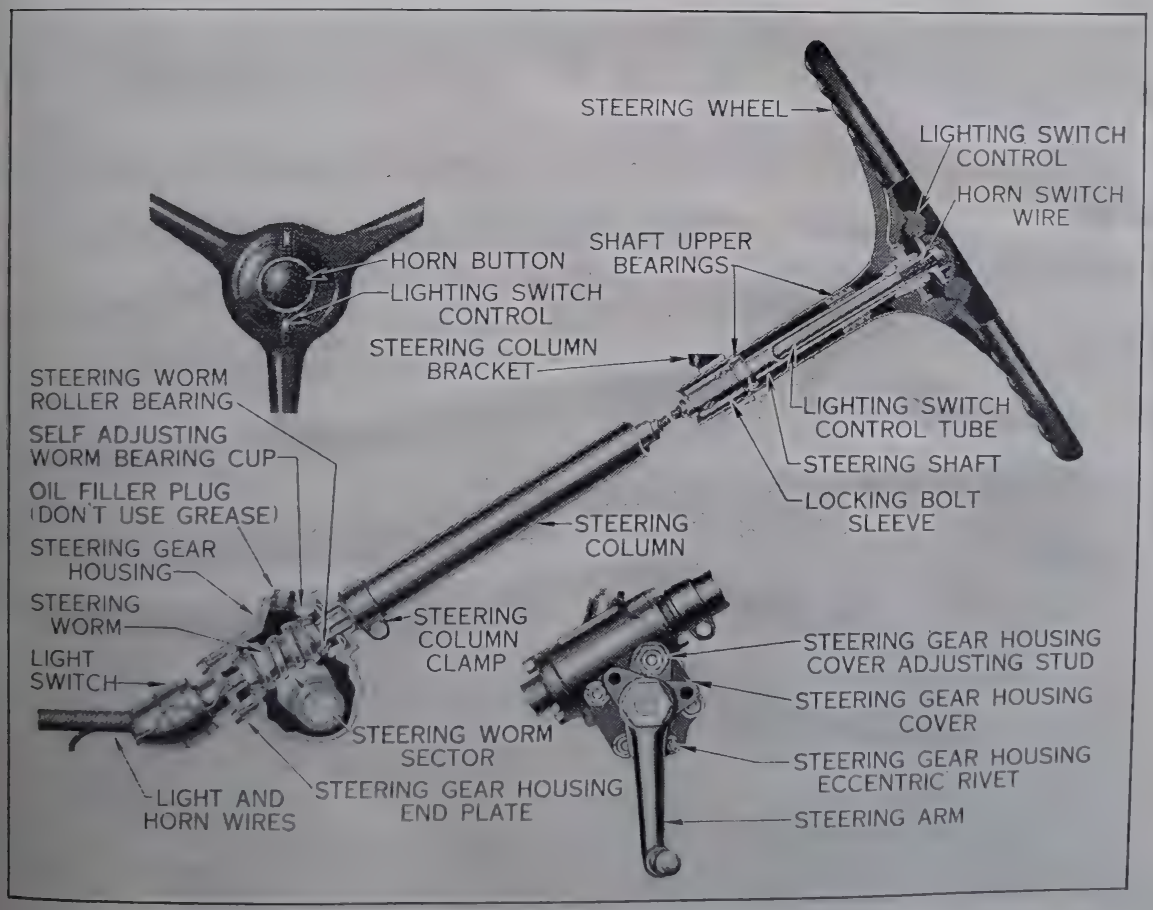
Never run on a flat tire, even for a short distance. Skidding also shortens the life of the tires. Avoid running in street car tracks, or bumping the sides of the tire against the curbing.

The Steering Gear

The steering gear on the Ford commercial car or truck is of the "hour glass" worm and sector type. The worm rotates on self-adjusting tapered roller bearings and requires little attention other than periodic lubrication (see page 12).

Means of adjustment to compensate for wear are provided. These adjustments, however, should not be attempted by the layman, and it is recommended that, when they are required, you consult a Ford dealer.

Improper tire inflation, incorrectly adjusted brakes or incorrect toe-in or wheel bearing adjustment of the front wheels have a very pronounced effect on the steering of the car. These points should be checked before any adjustment of the steering gear is attempted. Your local authorized Ford dealer can quickly diagnose and remedy any difficulty affecting the steering. Do not jeopardize your safety by makeshift adjustments.



The Steering Gear
Figure 20

Brakes

The braking system includes four internal expanding brakes, one at each wheel, operated by the foot brake pedal and the hand brake lever.

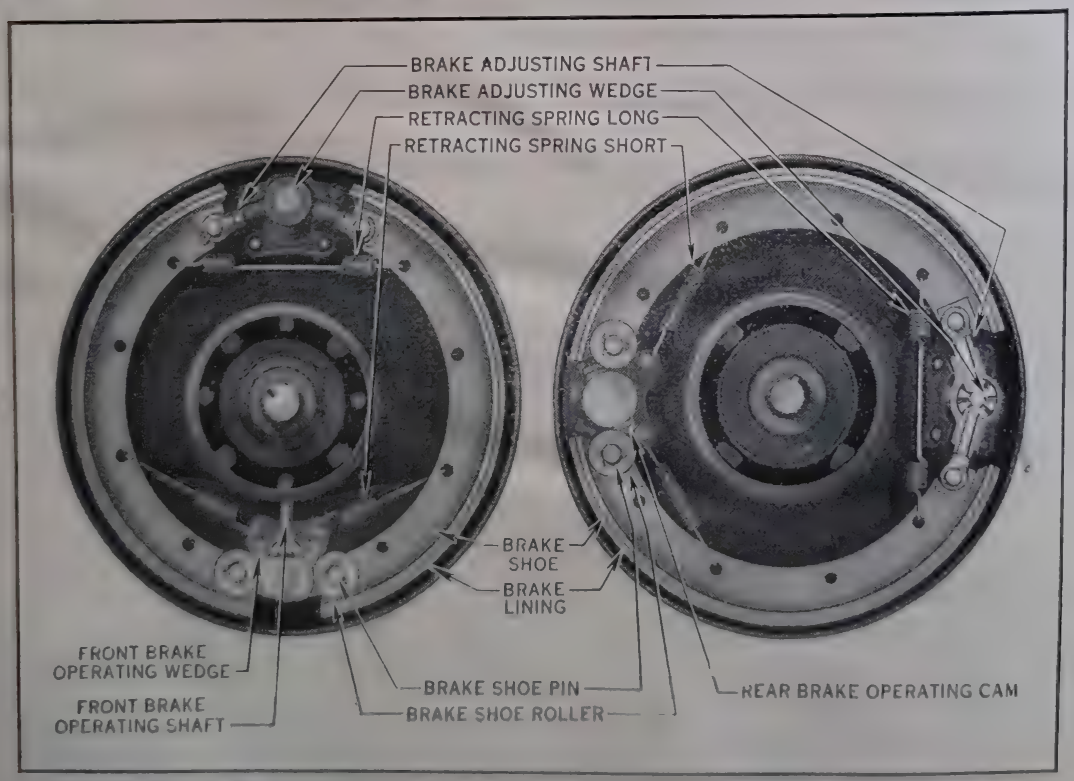
On the truck, the hand brake system is independent of the service brakes.

The brakes on both car and truck are of mechanically operated design of simple construction, insuring quiet and positive action and highest efficiency at all times.

Adjusting Brakes

Before attempting to adjust the brakes, equalize the air pressure in the tires.

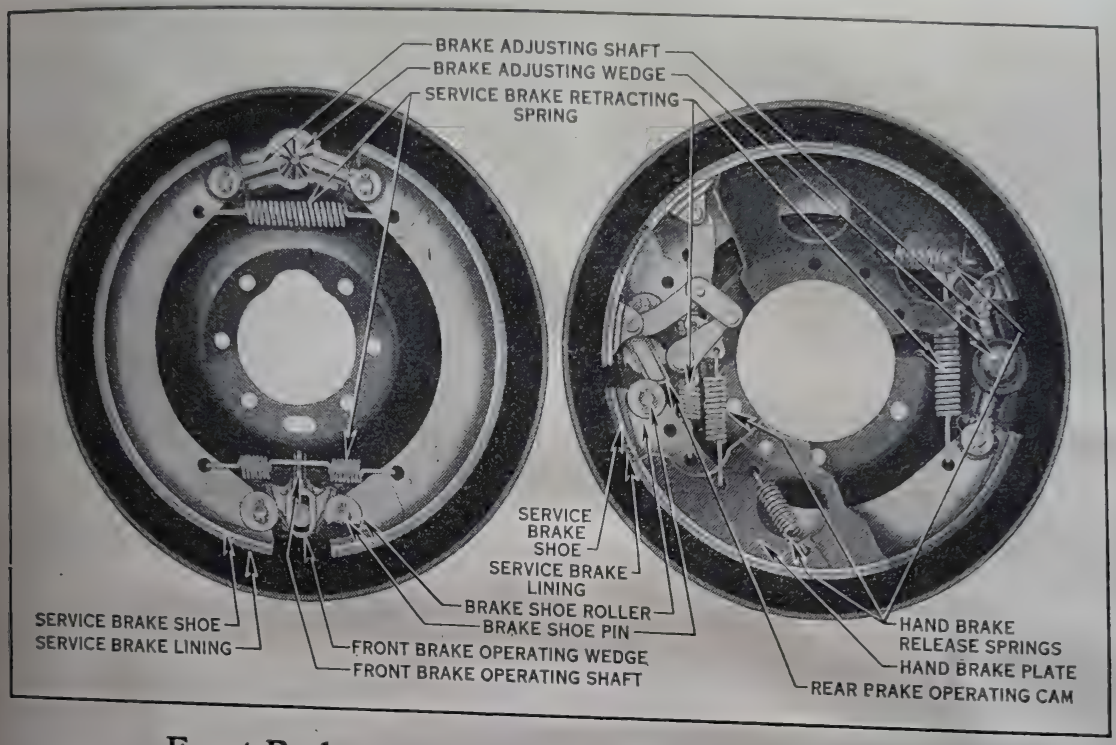
The most effective method of testing the brakes is by an actual road test. When, with the tires all inflated to the recommended pressure, a road test reveals the braking action to be unequal at the various wheels, or the pedal travel is to within two inches of the floor board, the brakes should be adjusted. Authorized Ford dealers can make this adjustment correctly and quickly at low cost.



Front Brake Rear Brake

Brakes Used on Commercial Car

Figure 21



Front Brake Rear Brake

Brakes Used on 1½-Ton Chassis

Figure 22

Don't jeopardize your safety by makeshift adjustments.

Adjustment is made by the screwing in of the adjusting screw provided at each wheel. (see Figs. 21 and 22). One or two notches should be enough ordinarily. Always jack up the wheel to see that the brakes do not drag after this adjustment.

Electrical System

The Battery

The Ford electrical system uses a six-volt, 80-ampere-hour, 15-plate battery, designed and built to meet the requirements of the Ford car.

Care of the Battery

Every two weeks check the electrolyte in the battery to see that it is at the proper level. The solution (electrolyte) should be maintained at a level with the bottom of the filling tubes. If below this point, add distilled water until the electrolyte reaches the proper level. Water for battery use should be kept in clean,

covered vessels of glass, china, rubber or lead. In cold weath add water only immediately before running the engine so tha the charging will mix the water and electrolyte and preven freezing. Access to the battery is easily made by removing small plate located in the floor board in front of the driver's seat Excessive use of water by the battery usually is an indication o charging at an excessive rate and the generator charging rat should be readjusted to more nearly conform with your electrica requirements.

Charging of the battery at an excessive rate materially shortens the life of the battery and is to be avoided.

To remove the battery it will be necessary to take out the floor board. When replacing the battery, be sure to install it with the **positive** terminal grounded.

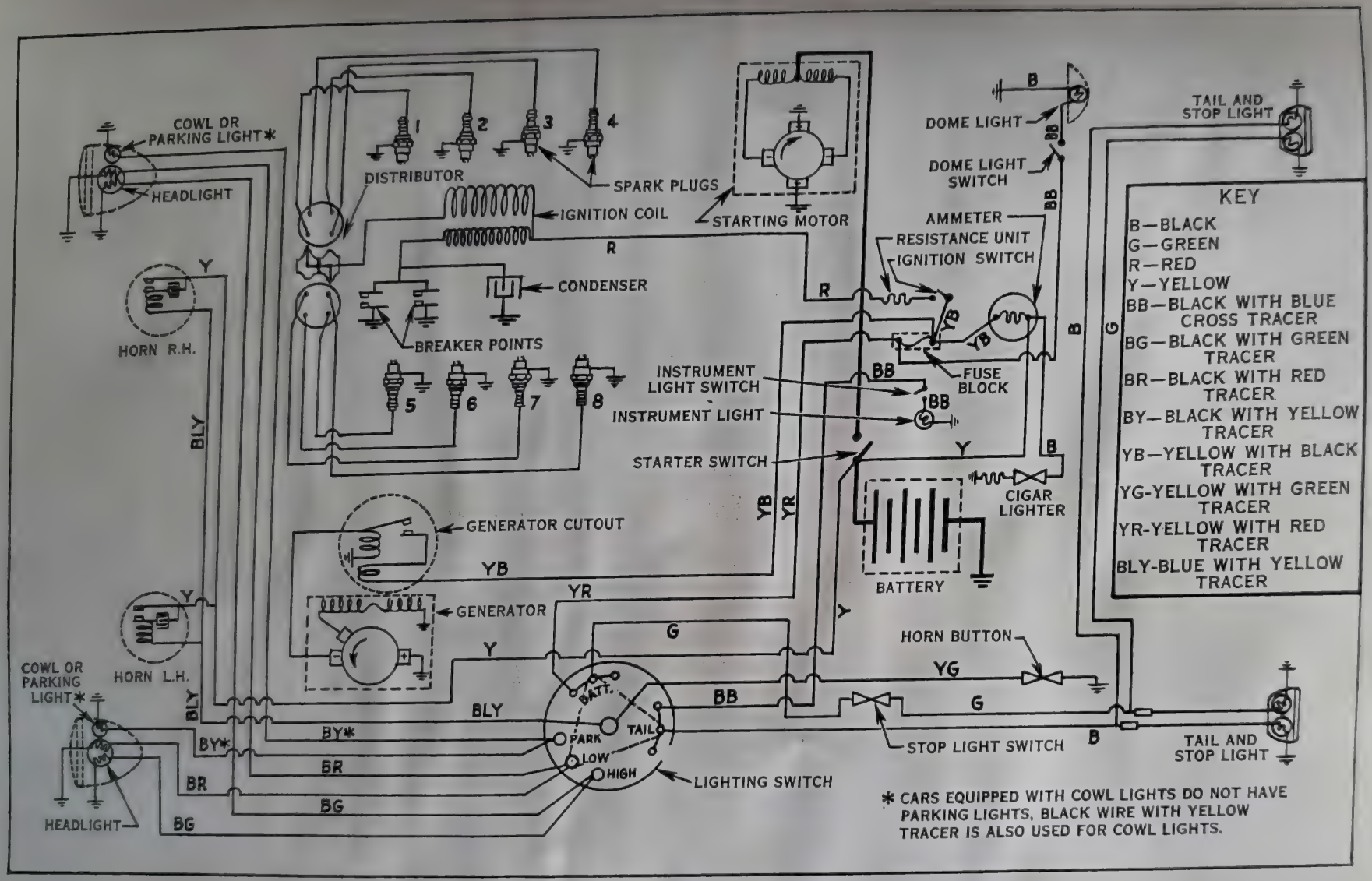
Loose or corroded battery connections increase the line resistance, raising the voltage of the generator often beyond the capacity of the light bulbs, causing them to burn out, and causing the breaker points to burn and pit.

Keep the battery filling plugs and connections tight, and the top of the battery clean. Wiping the battery with a rag moistened with ammonia will counteract the effect of any of the solution which may be on the outside of the battery. A coating of vaseline will protect the terminals from corrosion. It is of vital importance that the battery is firmly secured in its supporting brackets at all times. If clamps are loose, the battery will shift about in the compartment, resulting in loose connections, broken cells and other trouble. When repairs are necessary, or if the car is to be laid up for the winter, take the battery to a Ford dealer for proper attention and storage. Do not entrust your battery to inexperienced or unskilled hands.

The Generator

The charging rate must be adjusted to suit the individual electrical requirements of each owner. For example, the owner who takes long daylight trips should adjust the charging considerably lower than the owner who makes numerous stops or uses his lights or electrical accessories continually.

The ideal charging rate is the lowest rate with which full battery charge is maintained. Insist upon your Ford dealer properly adjusting this.



V-8 Wiring Diagram
Figure 23

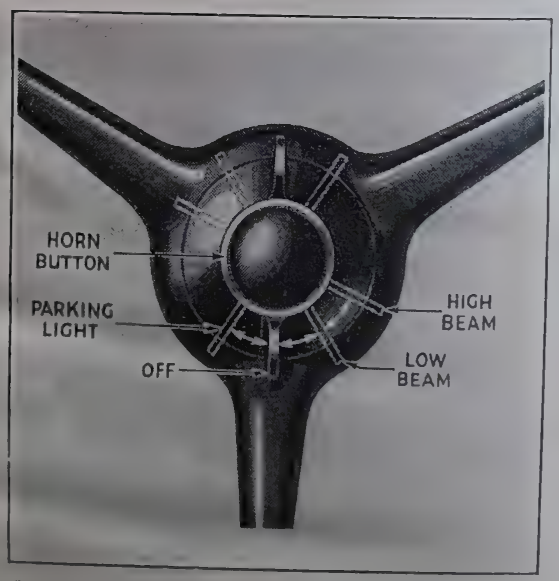
Increasing or Decreasing Generator Charging Rate

To increase or decrease the generator charging rate, remove generator cover and shift the "third" brush (shown in Fig. 5). To increase the charging rate, shift the "third" brush in the direction of rotation; to reduce the rate, shift the brush in the opposite direction. The output of the generator is indicated by the ammeter located on the instrument panel.

The Ammeter indicates charge when the generator is charging the battery. If the engine is running above 15 miles per hour and the ammeter does not register "charge" when the lights and other electrical accessories are "off" consult a Ford dealer.

Lights

The Lighting Switch is located on the top of the steering column in the center of the steering wheel. When handle points straight back the lights are "off." Moving the handle to the right or left closes the various circuits (see Fig. 24). The instrument panel light and tail light circuits are also controlled by this switch.

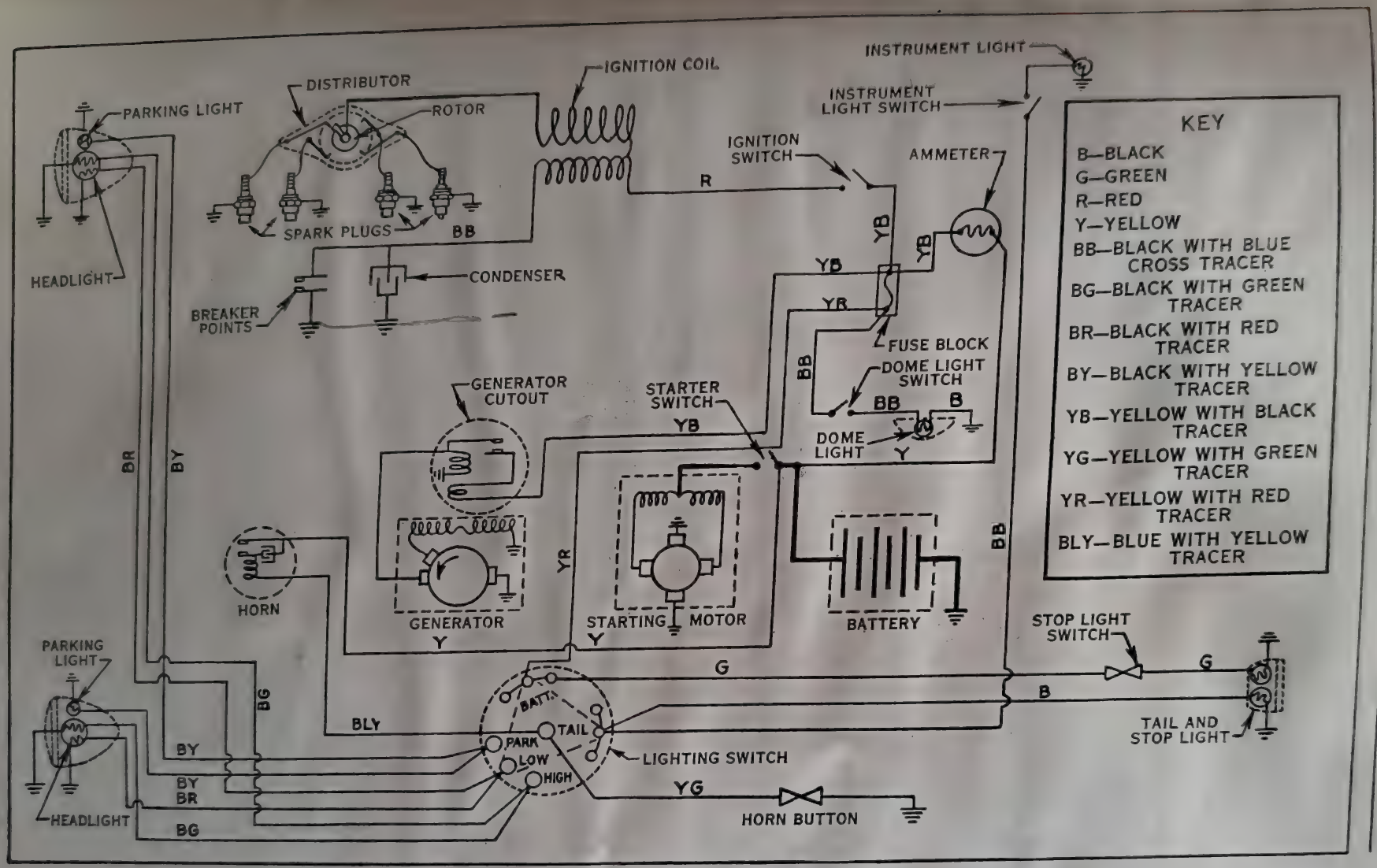


Horn Button and Lighting Switch

Figure 24

Light Fuse

Should the lamps fail to light when the switch is placed in any of the "on" positions, examine the fuse located on rear of dash in front of the instrument panel. If the fuse is burned out an examination of the various wiring connections should be made before it is replaced. Consult an Authorized Ford Dealer.



4 Cylinder Wiring Diagram
Figure 25

Headlight Requirements

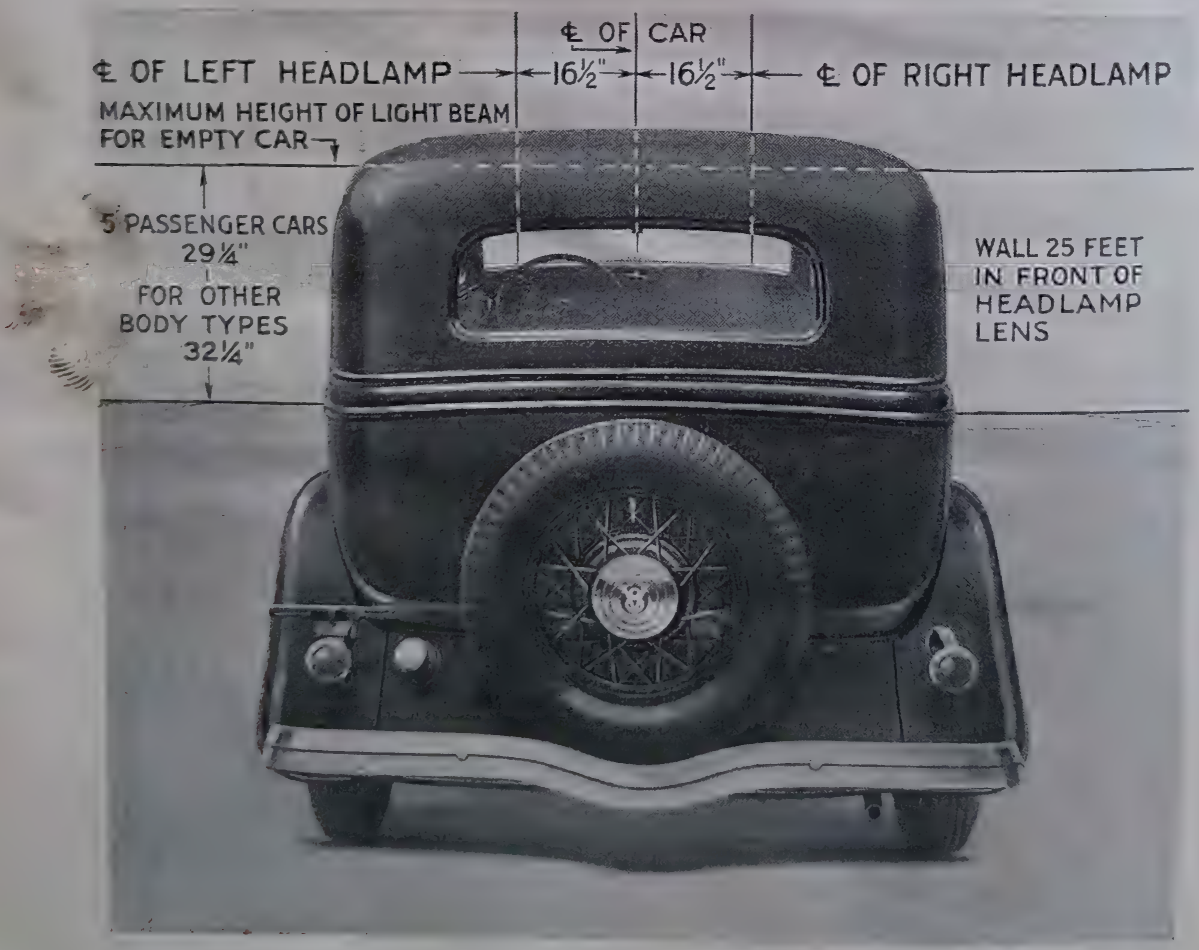
When the car is delivered, the headlamps are properly focused and aligned, and will pass the lighting requirements of all states.

The focusing of the lights is a permanently built in feature of the Ford headlights, requiring no attention. The focus will remain fixed as long as accurately built bulbs are used.

Should the lamps get out of alignment, they should immediately be realigned. Ford dealers are equipped for this service.

Aligning Headlamps

Position the car on a level surface in front of a white wall or screen, 25 feet from front of headlamps as shown in Fig. 26. The center line of the car should be at 90 degrees (right angle) from the wall. This wall must be in semi-darkness or sufficiently



Layout for Aligning Lights
Figure 26

shielded from direct light so that the light spots from the headlamps can be clearly seen. The wall must be marked off with black lines, as follows:

Sighting through the center of the rear window establish a vertical line on the wall in line with the radiator cap as shown in Fig. 26 (see center line of car).

Establish two additional vertical lines on the wall. These lines represent the center lines of the two head lamps and should be exactly 33 inches apart, each being 16½ inches from the line representing the center line of the car (see Fig. 26).

Establish one horizontal line on the wall as shown in Fig. 26.

For 5 passenger cars this line should be 29¼ inches above the level of the surface on which the car stands.

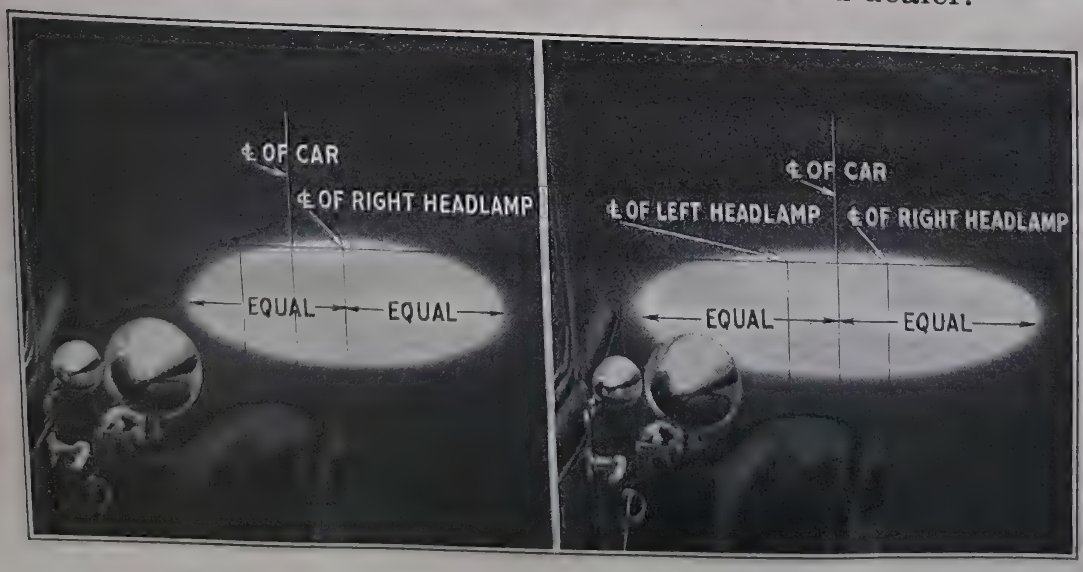
For all other body types and trucks the horizontal line should be 32¼ inches above the level of the surface on which the car stands.

Headlamps may be aligned by moving lamps after nut at bottom of bracket has been slightly loosened.

The beam of light from each headlamp is to extend straight forward, that is, the centers of the elliptical spots of light must be 33 inches apart as shown in Figs. 26 and 27.

The lamps should be set so that the top of the bright spots will be at the horizontal line on the wall with the car empty (see Fig. 27).

With tops of bright spots thus set for empty car the headlamps comply, under all conditions of loading, with the requirements of nearly all states. Consult your local Ford dealer.



Right Headlamp Properly Aligned

Both Headlamps Properly Aligned

Figure 27

Engine Ignition

The current for igniting the gas mixture in the cylinders is provided by the storage battery. The ignition coil transforms the low tension current to a high tension current of sufficient voltage to bridge the gap between the points of the spark plugs. The circuit breaker points interrupt the flow of low tension current at regular intervals, while the distributor rotor distributes the high tension current to each spark plug in proper firing order.

Spark Plugs

The spark plugs with which Ford engines are fitted when they leave the factory are best adapted to the requirements of the Ford engine. The gap between the points should be .025 inch for the V-8 and .030 inch for the 4 cylinder engine.

Distributor Adjustment

The highly efficient ignition system on the Ford cars should be adjusted only by Ford factory trained mechanics. No other one thing affects the operation of the car as vitally as incorrectly adjusted ignition which reflects in poor performance, high fuel consumption and overheating of engine.

The best assurance against trouble on the road is the periodical checking of the ignition system by an authorized Ford dealer.

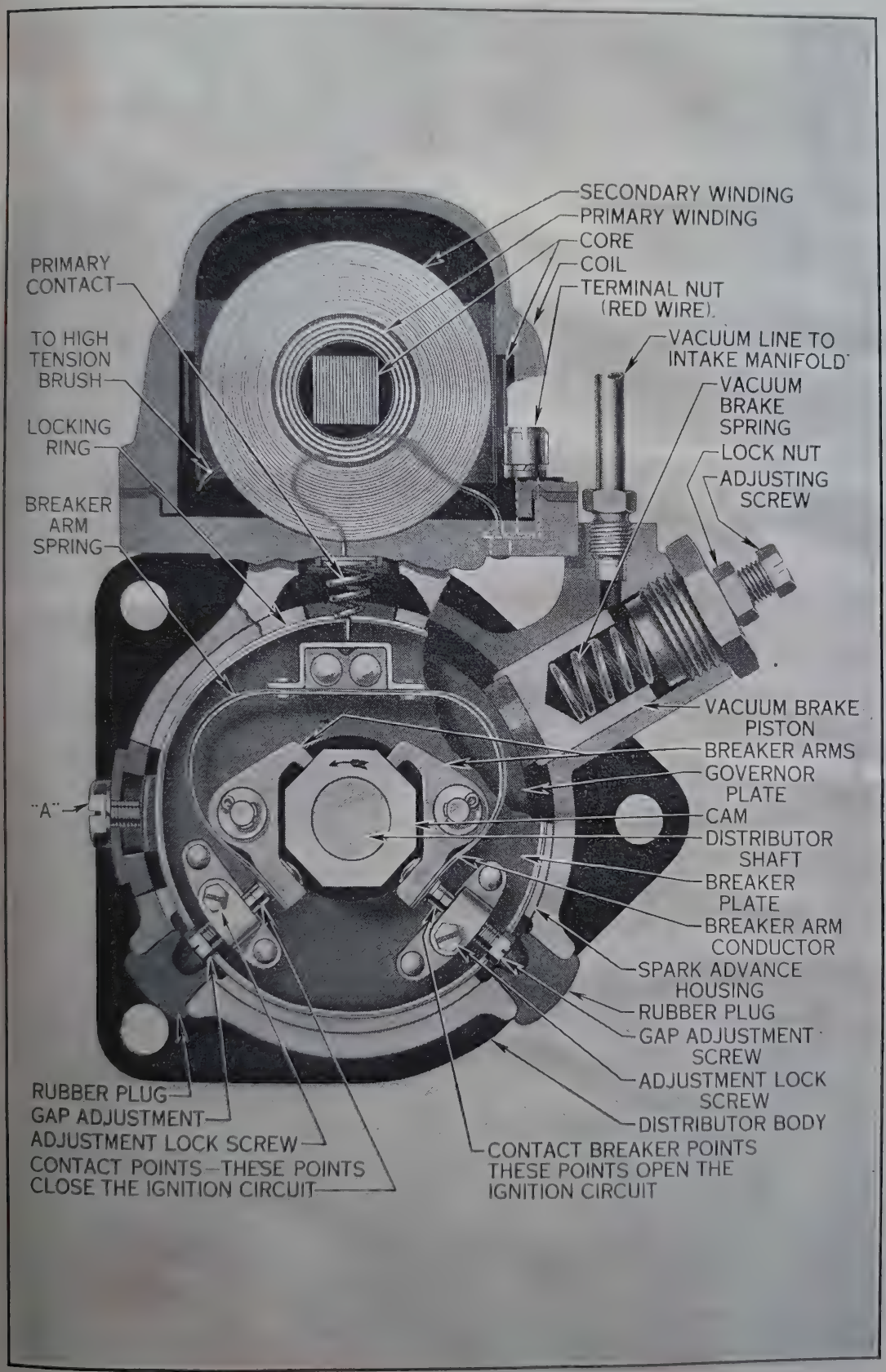
However, should trouble be experienced, which by the process of elimination as covered on page 22 appears to be the result of faulty ignition, if an authorized Ford dealer's service is not available, the following procedure will assist in correcting it:

To isolate cause of trouble with V-8 ignition

(1) Disconnect the red wire from the coil terminal nut (see Fig. 28).

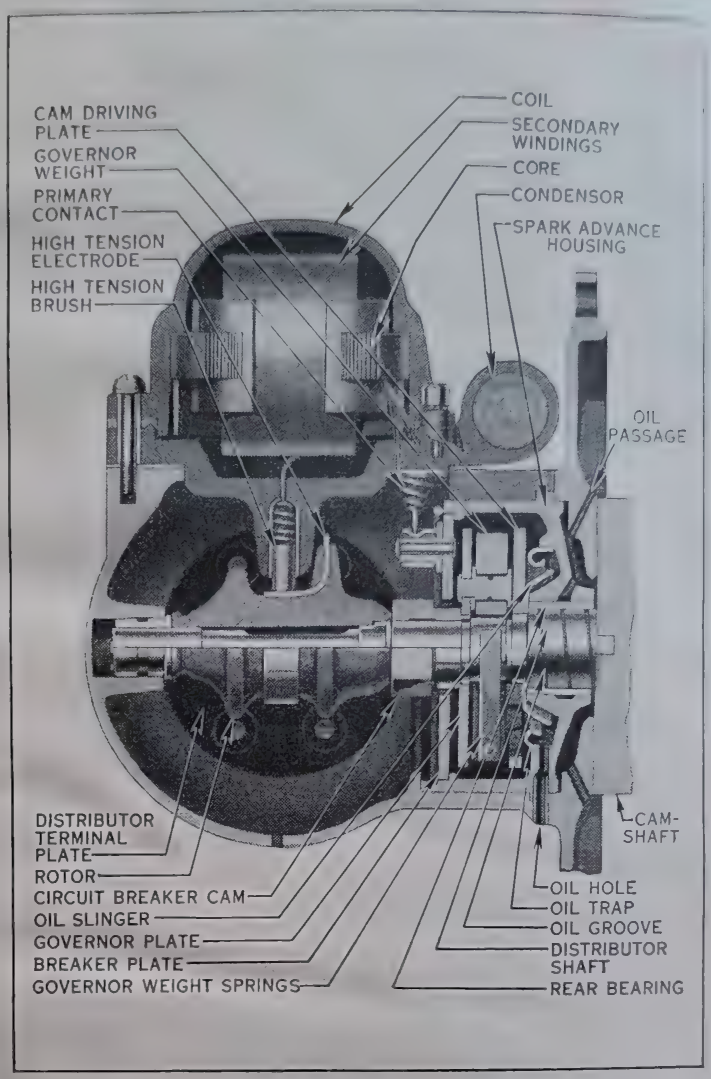
(2) Turn ignition switch to "ON" position.

(3) Momentarily touch disconnected wire to cylinder block. If spark does not occur, using Fig. 23 as a guide, check each wire and connection, back through the battery to the battery ground for a break in the circuit.



V-8 Coil and Circuit Breaker
Figure 28

(4) If spark occurs when the ignition switch to coil wire is grounded to the cylinder and no spark is noted at plugs as outlined on page 22, remove the distributor side covers and terminal plates and examine the breaker points (see Fig. 28). If the points are worn, pitted or burned, the breaker points and the condenser should be replaced (badly burned breaker points are usually an indication of a faulty condenser or a poor battery connection) or if the points are incorrectly spaced, adjust the gap to .012 to .014 inch with fiber breaker arm on the high point of the cam. Allow an authorized Ford dealer to check your adjustment.



Sectional View of Distributor

Figure 29

(5) If the trouble has not been corrected remove the distributor terminal plates (see Fig. 29) and side covers. Turn on ignition switch. Ground a wooden-handled screwdriver to the distributor body, holding the end of the screwdriver blade approximately 3/8 inch from the metal band around the center of the rotor (see Fig. 29).

When the engine is cranked a spark should occur between the rotor and the screwdriver. If a 3/8 inch spark occurs regularly further tests of the primary circuit and the coil can be eliminated.

If a spark of less than 3/8 inch only can be obtained the trouble is likely to be that the rotor, condenser or coil is shorted.

If no spark is noted the primary circuit is not completed at some point within the distributor. The primary circuit within the distributor may be traced by referring to Fig. 28.

If a satisfactory spark is obtained at the rotor and no spark is noted at the plugs, the spark plug wires, terminal plates or distributor side covers are shorted, probably due to the engine having been operated at sometime with one of the spark plug wires disconnected from either the spark plug or the terminal plate. To isolate the part at fault: while the engine is cranked hold in turn each spark plug wire (spark plug end) ⅜ inch away from the cylinder head. Any wire from which the spark bridges this ⅜ inch gap is satisfactory and can be eliminated from further tests. Any wires failing to meet this test should not be condemned until terminal plates and side covers are examined for evidence of leakage and no such evidence is found.

(6) Check the gap between the spark plug points. Clean the plugs and adjust gap to .025 inch.

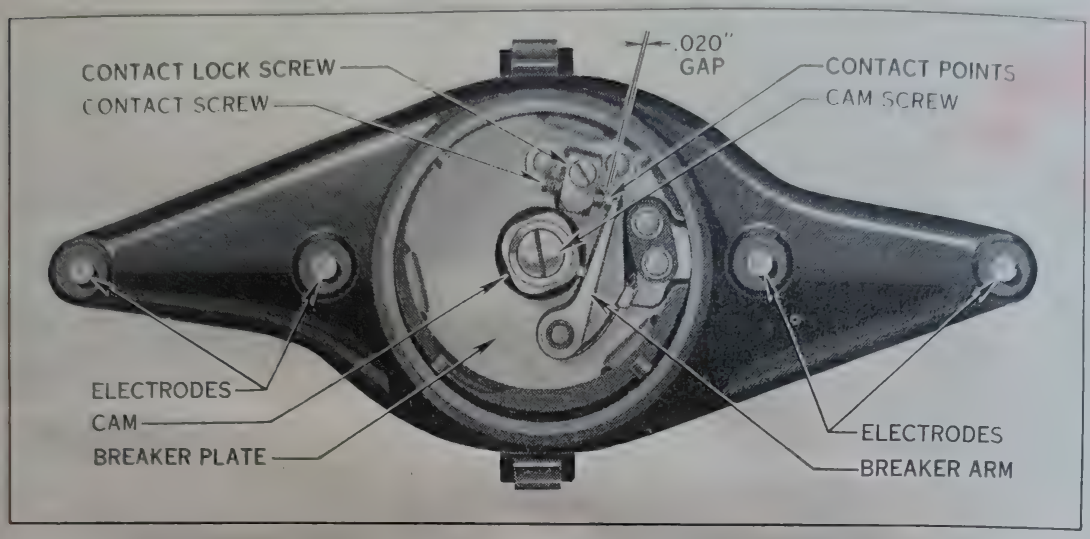
To Isolate Cause of Trouble with 4-Cylinder Ignition

(1) Disconnect the black wire with blue cross tracer, from the distributor.

(2) Turn ignition switch to "ON" position.

(3) Momentarily touch disconnected wire to cylinder. If spark does not occur, using Fig. 25 as a guide, check each wire and connection, back through the battery to the battery ground for a break in the circuit.

(4) If spark occurs when the ignition switch to coil wire is grounded to the cylinder, see that the coil to distributor (heavy rubber covered) wire is making good contact at both ends. If



Circuit Breaker
Figure 30

contact is good, remove the distributor cover and examine the contact points (see Fig. 30). If the points are worn, pitted or burned the breaker points and the condenser should be replaced (badly burned breaker points are usually an indication of a faulty condenser or a poor battery connection) or if the points are incorrectly spaced, adjust the gap to .018 to .022 inch with the breaker arm fiber block on the high point of the cam. Allow an authorized Ford dealer to check your adjustment.

(5) Check the gap between the spark plug points. Clean the plugs and adjust to .030 inch.

Distributor and Circuit Breaker (V-8 Engine)

The distributor used on the Ford V-8 is located at the front of the engine and is driven direct by the camshaft, thus eliminating many parts.

The spark timing is automatically retarded by the centrifugal governor weight springs for starting. By means of this centrifugal governor, the spark is automatically advanced at increased engine speeds in direct proportion to the speed.

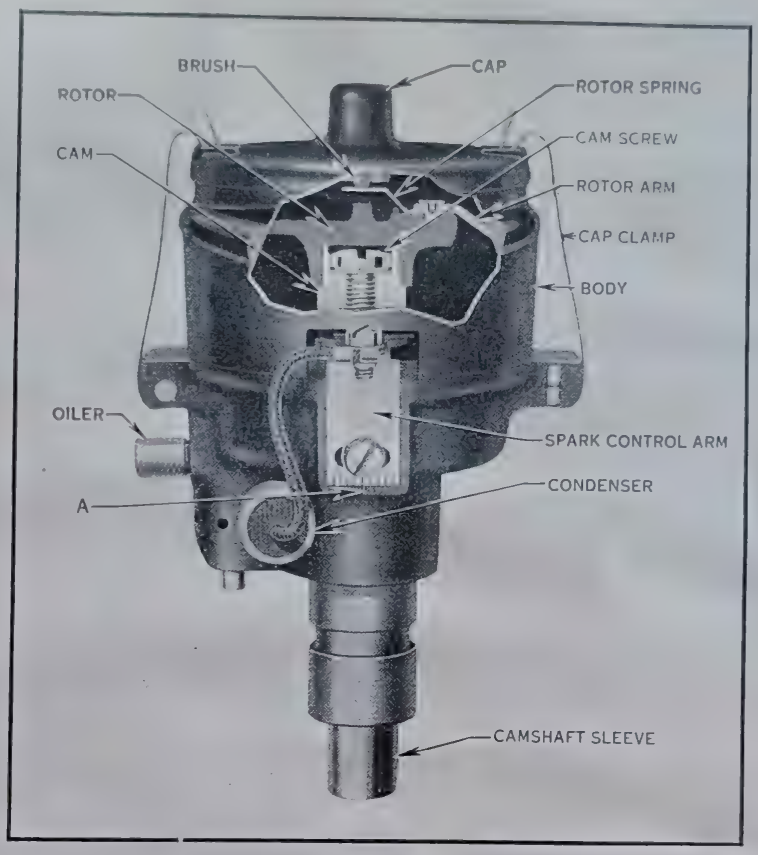
The spark timing is automatically retarded by the vacuum brake under load in direct proportion to the load.

The vacuum brake consists of a plunger or piston which is held against the braking surface of the governor plate by a spring of adjustable tension. As the rapidity of combustion is dependent on the degree of compression, the need of a retarded spark for quick acceleration or power is not dependent entirely on engine speed.

Distributor and Circuit Breaker (4 Cylinder Engine)

The distributor used on the Ford four cylinder engine is located at the right side at the top of the engine.

The spark timing is automatically retarded by the centrifugal governor weight springs for starting. By means of this centrifugal governor, the spark is automatically advanced at increased engine speeds in direct proportion to the speed.



Rear View of Distributor

Figure 31

Timing Either Engine

Means of adjusting the timing of the ignition to meet the requirements of the fuel used and the type of service in which the car or truck is operated has been provided (see "A", Figs. 28 or 31).

To advance the spark on the V-8, move the screw up (see "A", Fig. 28). Be sure to tighten lock screw after this adjustment.

To advance the spark on the 4 cylinder engine, move the spark control arm (see "A," Fig. 31) to the left (be sure to tighten lock screw after this adjustment).

Index

Index—*Continued*

SUGGESTED FORM FOR OPERATING COST RECORD

Date	Mileage	Gasoline		Oil		*Repairs Cost		†Miscellaneous Cost		REMARKS
		Gls.	Cost	Qts.	Cost	Pts.	Lbr.	Pts.	Lbr.	

FIXED COSTS

Annual Cost

‡Insurance—Fire and Theft, Liability and Property Damage . $_____

††License and Taxes . . . . . _____

‡‡Depreciation . . . . . _____

Total Fixed Costs . . . . . _____

Total Mileage . . . . . _____

SUMMARY

	Total	Per Mile
Operating Cost	$_____	$_____
**Fixed Cost	_____	_____
Total Cost	_____	_____

*Repairs
Include all repairs made to vehicle, including repair or replacement of tires and tubes, and repairs to accessories.

†Miscellaneous
Include items such as storage, washing, bridge and ferry tolls, and other such miscellaneous expenses, also lubrication service. Indicate in remarks column the particular items for which amount is charged under "Repairs" or "Miscellaneous."

‡Insurance
Show actual annual premiums covering fire and theft, or liability and property damage insurance, as well as any other insurance costs.

††License and Taxes
Show your actual yearly cost of license and taxes.

‡‡Depreciation
Base your annual cost on your own past experience. In case you have no past records to guide you, it is suggested that you figure yearly depreciation at 25% of the cost of your vehicle until you have gained experience as to your actual depreciation cost.

**Fixed Cost
If for less than one year, compute portion of fixed cost applicable.

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